

# Machine and Tool **BLUE BOOK**

A HITCHCOCK PUBLICATION

DECEMBER, 1961 • 50 CENTS

**Diesels Sport New Jackets**

**A CHECK LIST for  
Evaluating Progressive Dies**

**Innershield Squirt Welding  
DOUBLES PRODUCTION**

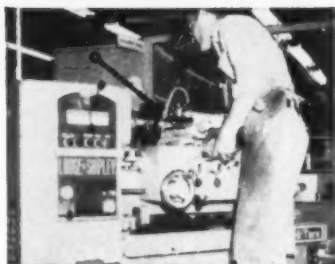
**HERE'S ONE WAY to  
Machine Unwieldy Work**

**Many Methods of  
APPLYING LUBRICANTS**

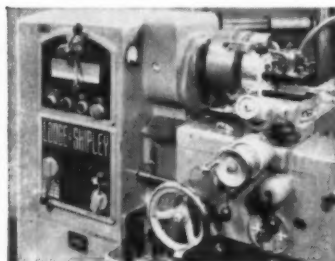
**THE CASE FOR HONING  
Carbide Cutting Tools**

**NUMERICAL CONTROL and  
Personnel Requirements**

COMPLETE CONTENTS ON PAGES 3 AND 5



Dalmotor Div., Yuba Consolidated Industries . . .  
"used in model shop for turning, facing and  
boring all sorts of experimental parts."

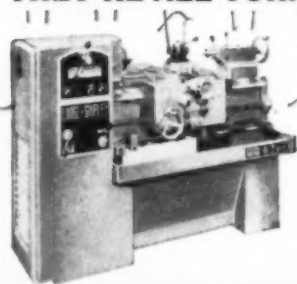


Raytheon Manufacturing Co. . . . "used for  
turning, facing and boring operations on brass,  
aluminum and steel workpieces."

Over an extremely wide range of American industry . . . for tooling, production, maintenance and experimentation . . . the Lodge & Shipley 1307 HI-TURN (10") Lathe is making a record of true economy. With literally dozens of big lathe features, the HI-TURN is still priced substantially below many lathes having fewer features, less horsepower and lighter construction.

Turn your attention to HI-TURN. Find out why these and many other lathe users are ordering and reordering HI-TURN Production and Tracer Lathes to replace or supplement larger, far more costly lathes. For complete details, request Bulletin 331, The Lodge & Shipley Co., 3074 Colerain Ave., Cincinnati 25, Ohio.

## THEY'RE ALL TURNING TO **Hi-Turn**

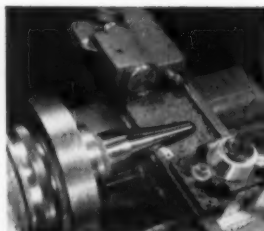


... your Lodge-ical choice

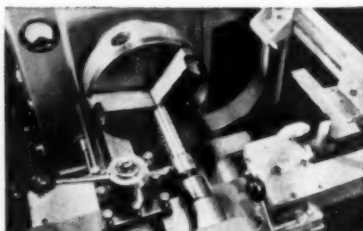
# **Lodge & Shipley**



Rocketdyne Div., North  
American Aviation . . .  
"held OD turning to a toler-  
ance of .0003".



Leading glass manufacturer . . . "un-  
heard of economy, ease and speed  
of production" on machining and  
reworking glass bottle tooling.



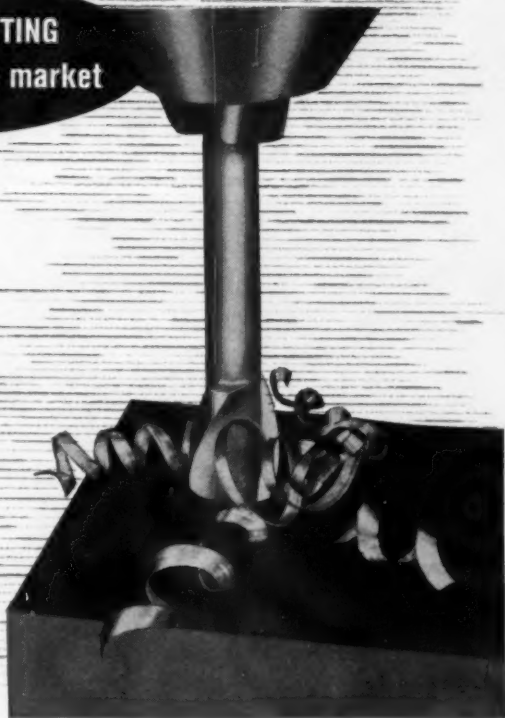
Indiana Gear Works . . . has earned a reputation  
of "excellent for high production."



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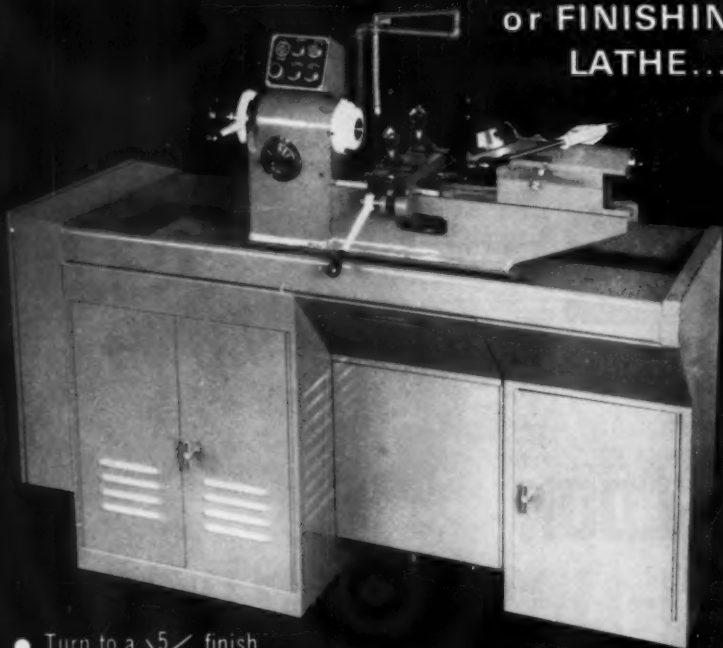
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# Machine and Tool BLUE BOOK

*for the Men of Action in Metalworking*

## DIESELS SPORT NEW JACKETS

92

Here are some of the advanced techniques in forming, welding, expanding, machining, surface treatment, and brazing being used by Electro-Motive Div. on a production line to fabricate cylinder liners.

## A CHECK LIST FOR EVALUATING PROGRESSIVE DIES

R. J. Rizzo

100

Individuals working independently on the same problem often produce strikingly similar results. This check list comprises a few apparently fixed universal rules that have guided the author over the past twenty years.

## INNERSHIELD SQUIRT WELDING DOUBLES PRODUCTION

H. J. Dubina

106

A new development in welding, flux-cored electrode wire which is completely self-shielding, is speeding production where manual stick welding with iron powder electrodes have been used.

## HERE'S ONE WAY TO MACHINE UNWIELDY WORK

109

Portable machining heads that are precisely positioned by locating cones imbedded in a concrete foundation enable a fabricator of large, awkward steel structures to machine various surfaces quickly and accurately.

## NOMOGRAPHS FOR TUBE-BENDING MANDRELS

111

Two nomographs are shown, one to determine the type of mandrel needed and one to determine the number of balls needed in an articulated mandrel.

## CUMULATIVE INDEX OF MAJOR ARTICLES, JAN.-DEC., 1961

127

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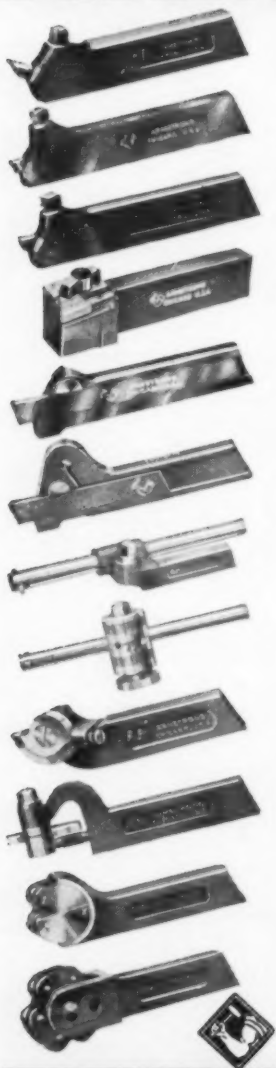
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You can save time (and money) by ensuring that your machine tools are equipped with *adequate numbers* of the correct ARMSTRONG Tool Holders. The ARMSTRONG System of Tool Holders includes correctly designed tools for *every* standard operation on lathes, shapers, and planers, and for many operations on turret lathes and screw machines. By utilizing the ARMSTRONG System of Tool Holders, you can reduce tooling costs, eliminate down time in tooling up, operate your machine tools at maximum feeds and speeds.

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Distributor, inquire when  
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## CONTENTS continued

### COLUMNISTS

- LUBRICANTS AND COOLANTS** A. F. Brewer 113  
 "Many Methods of Applying Lubricants" are used but here are described the benefits derived from automatic lubrication.
- INTERESTING MOTIONS** L. Kasper 118  
 "One Slide Operates Two Others" in a tight situation. The original linkage design was used on a wire forming machine.
- CUTTING TOOLS** W. E. Montgomery 120  
 "The Case for Honing Carbide Cutting Tools" is different for varying situations. The author points out how honing varies.
- NUMERICAL CONTROL FOR THE MACHINE SHOP** J. J. Childs 123  
 "Numerical Control and Personnel Requirements" are analyzed this month. Several job functions are explained, that are necessary for implementing NC in a machine shop.

### DEPARTMENTS

- With the Editor .....E. Altholz 7
- THIS MONTH in Metalworking ..... 10
- WHAT'S NEW in Materials ..... 38
- Catalogs . . . Manuals . . . Bulletins ..... 44
- Book Reviews ..... 62
- Shop Hints ..... 133
- WHAT'S NEW in Metalworking ..... 141
- Product Index ..... 240
- Advertisers' Index ..... 244
- One Last Word .....W. F. Schleicher 249

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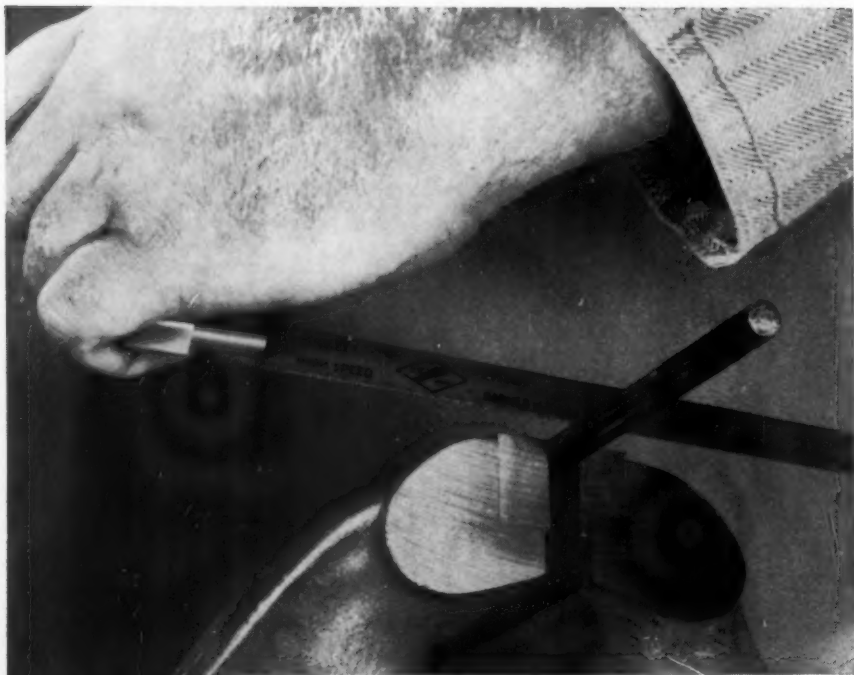
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An ideal blade for machine shop use. Preferred by the experienced tool maker.

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Unequalled for use in the tool room to cut die steels and abrasive materials.

Modernly packaged and color-coded for easy identification, Barnes blades are positively protected to reach you factory-new and ready-for-work.

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## WITH THE EDITOR :

BB

### *That Sticker is Still Appropriate*

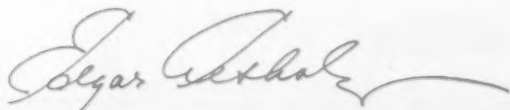
Twenty years ago this month the ignominious Sneak Attack precipitated America's entry into a war for which it was ill-prepared. Overnight the conflicts in the Far East and in Europe had merged into global war. Our Pacific fleet had suffered near-mortal wounds. The millions destined to defend this country in uniform had yet to be mobilized, equipped, and trained. On the home front, those who until then had only been participants-in-sympathy and those who had been staunch isolationists had yet to be amalgamated in an all-out productive effort. Time was short, and the price of peace seemed unconscionably high. The un-merry Christmas of 1941 was the nadir of adversity.

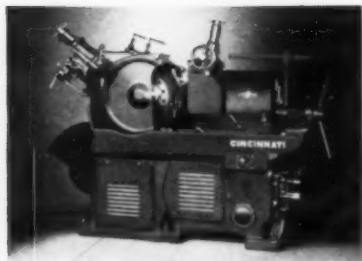
Of the many morale boosters which made their appearance in the ensuing months, one of the most compelling took the form of a little sticker dis-

tributed to metalworking plants by the Warner & Swasey Co. Its message: "THIS WAR WILL BE DECIDED IN THE MACHINE SHOPS OF AMERICA. I PLEDGE TO DO MY PART FOR VICTORY."

That sticker put virtually every machinist and machine tool operator in the country right on the front line. It found its way onto a lot of car windshields, machines, and locker doors. Its impact was terrific. The productivity of those workers made history.

Today, two decades later, the slogan on that sticker is no less meaningful. Are we not now in the throes of another type of war? Are we not now deeply embroiled in a science race? an economic race? a spiritual race? With diligence and with maximum utilization of our creative energies, today's war could also be decided in the machine shops of America.





## NOTICE

### to owners of thousands of CINCINNATI Centerless Grinding Machines built between 1935 and 1945:

Almost everything about your old CINCINNATI Centerless Grinder is obsolete! It may be just as good as the day you bought it, but that's no longer good enough!

Your machine is obsolete because our new Centuramic makes available substantial increases in quality, accuracy and dependability—and important reductions in your costs. Here are the features that make the new Centuramic such an efficient producer:

**MORE POWER, WEIGHT AND RIGIDITY.** Higher rates of stock removal are practical,

at the same time holding far better tolerances on a production basis.

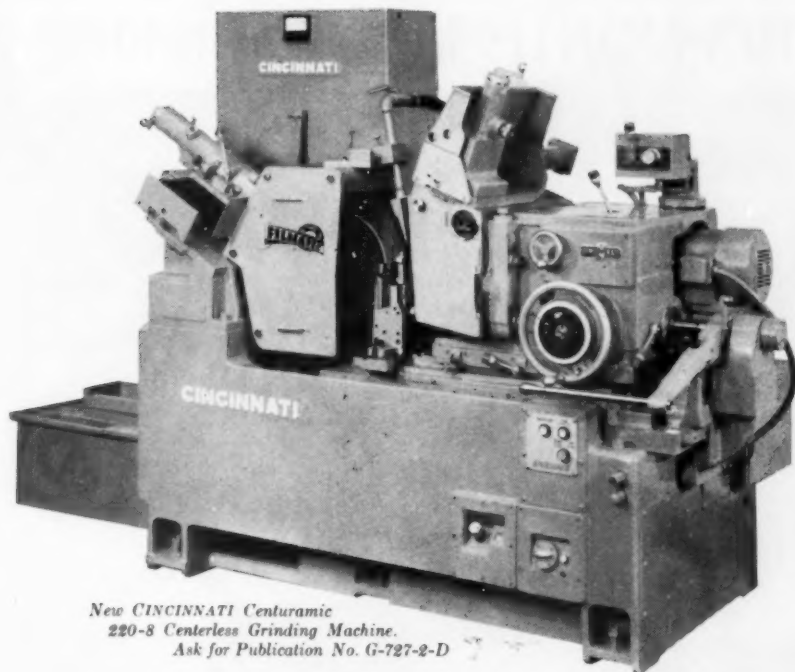
**AUTOMATIC GRINDING WHEEL BALANCING.** Without this feature you are probably spending more than one hour balancing the wheel. It takes only a few seconds with automatic balancing. You get better accuracy, longer wheel and diamond life and shorter grinding cycles.

**ELECTRO-HYDRAULIC INFED.** Feed rate and sparkout time are precisely the same for each part.

**OPERATOR EFFICIENCY.** All working areas have been freed of obstructions. Con-



BUILDERS OF PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • ROLL  
THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO



New CINCINNATI Centuramic  
220-8 Centerless Grinding Machine.  
Ask for Publication No. G-727-2-D

trols are centralized (convenient rear handwheel available) to permit operators to produce more with less effort.

**FAST TAPER ADJUSTMENT.** You simply adjust at front of machine *without* disturbing alignment of workblade, guides and regulating wheel. A great time saver!

**MANY MORE COST-REDUCING FEATURES.** Up to 20" wide grinding wheel—fewer passes, more economy. Hydraulic grinding wheel reciprocation for better finish on infeed jobs. Ball slides for high precision adjustment, minimum wear. Differential handwheel adjustment to .000050". In-

finitely variable regulating wheel speeds.

**EXCEPTION.** One feature of your old CINCINNATI Centerless is *not* obsolete—the Filmatic grinding wheel spindle bearings. This is the only feature on which we've not been able to improve. After 23 years, we've repaired only 0.1% of the many thousands in use!

If you care about costs and competition, you'll call in your Cincinnati representative right away. Ask him about the special trade-in proposition we're offering to make it easy to replace those old CINCINNATI Centerless Grinding Machines.

HUCKING • MICRO-CENTRIC • PRODUCTION LINES

**CINCINNATI**

GRINDING MACHINE DIVISION

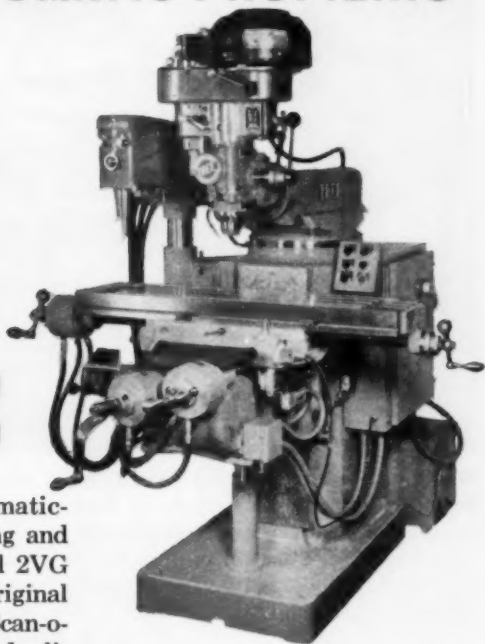
## THIS MONTH in Metalworking



**ROOM WITH A VIEW**—Possibly the most eye-filling machine shop in the world is this one at Hughes Aircraft Co.'s research laboratories at Malibu, Calif., where an expanse of window overlooks the Pacific Ocean stretching northwest toward Santa Barbara and south toward Santa Monica, with a famed cinema beach colony directly below. The labs' director believes it vital to scientists to have machinists and a machine shop on the premises to carry out their ideas immediately. Here, research scientists work on a wide variety of space age projects such as ion engines for propelling a vehicle billions of miles to Pluto and a "coherent" light beam for handling space communications. . . .

**ACCURATE AUTOMATIC  
3-DIMENSIONAL DUPLICATING  
AND SEMI-AUTOMATIC PROFILING**

**TREE  
SCAN  
-O-  
MATIC**



Scan-o-matic adds fully automatic-hydraulic 3-dimensional scanning and profiling to the Tree 2UVR and 2VG Mills, yet maintains their full original ranges and capacities. In the Scan-o-matic system of 3-dimensional duplication the stylus follows the contour of the model operating a dual valve which coordinates the knee and table or knee and saddle motions. The Tree Scan-o-matic machine operates *automatically* for close tolerance duplication or *semi-automatically* for profiling. Special constant torque hydraulic motors drive the lead screws of the mill thus retaining the original ruggedness for heavy milling.

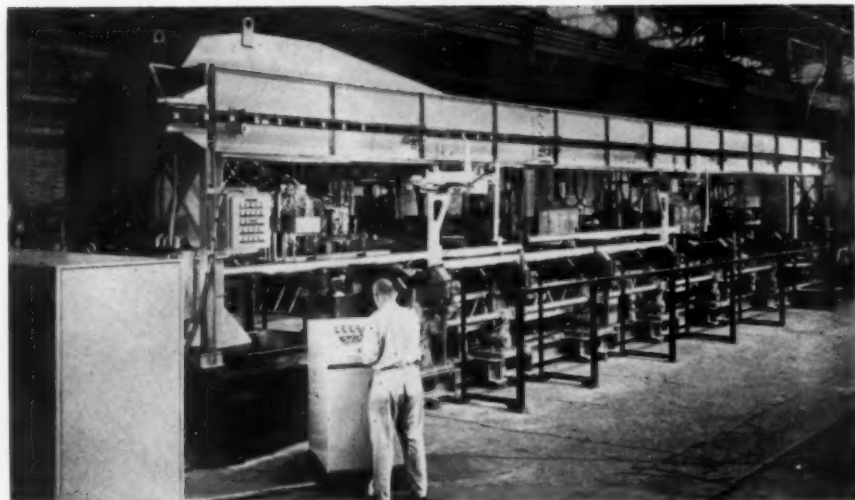
**SCAN-O-MATIC FEATURES**

- Fully automatic
- Scans in either direction
- Uniform cutting feed
- Constant stylus deflection
- Automatic shutdown



**TREE TOOL & DIE WORKS**  
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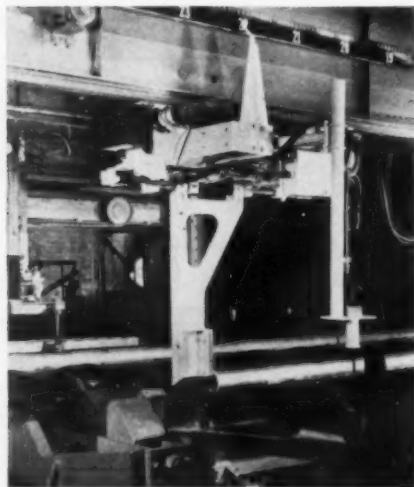


**Weighing, measuring, and identifying heavy oil-field pipe** is now being done automatically at Baldwin-Lima-Hamilton's Industrial Equipment Division. A system, which consists of a complete mechanical installation for mill han-

dling of heavy pipe, a special-purpose computer, and instrumentation and controls, is believed to be the first major step toward eventual full automation of pipe mills and toward automatic loading of boxcars, where pipe must be segregated within narrow tolerances. The system processes a pipe section every 18 to 36 seconds.

Pipe entering the system is picked off loading arms by a synchronized transfer mechanism. Entering the first of two stations, it is supported for length measuring, weighing, and counting. Feeler arms move up against the ends of the pipe (shown) and a differential servo system translates the distance the feeler arms move into an electrical signal proportionate to length. Weight is then checked by load cells with a null balance detecting system.

From the weigh bridge, the pipe moves to the second station where it is stenciled automatically from an





# THE MOORE MODEL

## No. $1\frac{1}{2}$ JIG BORER


—the modern version of the world-famous No. 1 Jig Borer

While providing all the successful basic features of the No. 1 machine, the Moore No.  $1\frac{1}{2}$  Jig Borer also cuts its tolerances in half. . . . you have these 14 "PLUS" features:

1. Closer tolerances
2. Infinitely variable spindle speed, 120 to 2400 R.P.M.
3. Vee and flat ways, no gibs, longer life
4. No overhang of table or slide
5. Two feeds, .001"—.003"
6. Larger table— $10\frac{1}{2}$ " x  $19\frac{1}{2}$ "
7. Single, lever, front & back table clamps, non-influencing
8. More accessible cross clamps, all non-influencing
9. Protected chrome-plated dials and reference scales
10. Micro-setting of vernier dials
11.  $1\frac{3}{8}$ " dia. Nitroloy lead screws
12. Wider column & vee ways
13. More rigidity, more weight (2300 lbs., compared with 1700 for No. 1)
14. J.I.C. conformity

*Write today for illustrated folder giving details, including specifications.*

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JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

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December, 1961

13



## THIS MONTH continued

overhead air-operated platform. A memory device permits processing of two pipes simultaneously, with the stenciling of one pipe being done while a second pipe is being measured and weighed.

The unit measures 65' in over-all length, and accepts pipe in lengths to

50'2" and 4½" to 10¾" diameters. Accuracy is within ½" and weight, 1/10 of one percent. The machine also prints a record for each individual pipe.

Only one part-time attendant is needed whereas a crew of four to eight were formerly required for weighing, measuring, tallying, and stenciling the pipe.

• • •

**Disasterous landing gear failures from hydrogen embrittlement** in steel are being eliminated through the use of a huge vacuum plating chamber, now in operation at Anadite, Inc., South Gate, California.

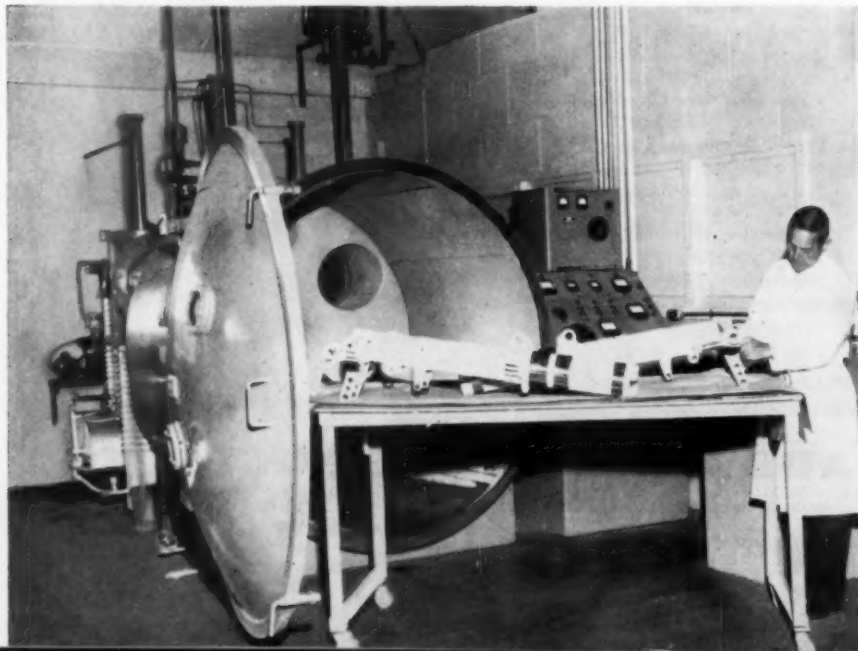
The chamber is designed primarily for the vacuum cadmium plating of strategic aircraft and missile parts, such as landing gear sections (shown), pressure vessels, springs, fasteners of all types, and also low-stress steel where solution entrapment is con-

sidered a major problem.

The throwing power of this vacuum plating method virtually excludes all problems of solution entrapment which eventually cause dissolution of the base metal.

Thickness of the coating can range from .0003" to .0015". Corrosion resistance of this film far exceeds that of electrolytic plating and more than meets requirements of the military specifications for cadmium plating.

• • •



# BORING

## CRITERION

Criterion makes 26 different models with a boring range of  $\frac{1}{8}$ " to 20".

Among those available, you may select tenth-setting heads for extremely close work, square and slotted bar holder heads for special application, and a variety of hole sizes from  $\frac{3}{8}$ " to  $1\frac{1}{2}$ ".

Whatever your requirements, there is a Criterion Boring Head that will do your job.

Shanks and adapters for all standard machines are available at your Criterion dealer. Ask him to show you the complete line of Criterion Boring Heads, shanks, boring, grooving and threading tools.

When choosing your boring equipment look to the name that has consistently stood for the highest quality for the past 25 years.

For more information on Criterion Tool Products, write for free literature or consult the dealer in your area.



## HEADS

CRITERION MACHINE WORKS  
756 W. 16th STREET, COSTA MESA, CALIFORNIA

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# How to save money and make money with modern metallizing

***With today's improved metallizing materials and methods:***

**PLANT EXECUTIVES** find new ways to slash maintenance costs, reduce downtime, cut machine parts inventory...

**JOB SHOP OPERATORS** find new ways to build highly profitable business doing parts-salvage and maintenance work for plants in their area.

**JOB SHOPS**  
make good money with  
metallizing because they save  
good money for local firms.

METCO has prepared a special bulletin detailing actual operations and costs of typical flame spraying work on shafts, templates, bearings, many other surfaces. Use coupon to get your free copy.

**NEW! Business-building kit for job shops**, to help METCO equipment owners build new business, pay off investment in minimum time, and use flame spraying to increase other machining and welding business. Contains samples of direct mail letters, post cards, envelope stuffers, photos, advertising mats. These promotion materials are available in lots of 100 at our cost, well below what you'd have to pay to print your own. One copy of kit available free — send for it today. (See coupon.)

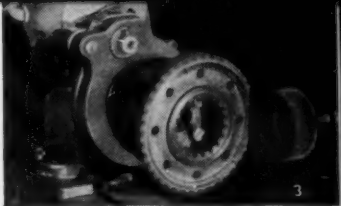
**These real-life examples show how plants save money, job shops make money with metallizing**

Necks of winding rolls in a textile mill were formerly repaired by a slow machining method, requiring highly skilled labor. Now the worn necks are built up with flame sprayed metal, quickly machined to size. Savings run \$20,000 a year.

A job shop in California specializes in flame spraying oil well pump plungers, gets all the business it can handle in spite of the fact that the plungers it hard-faces last eight times as long as new ones. The largest ones cost only \$45.00 to rebuild, against \$110 to replace. Volume on just this one profitable metallizing service: \$35,000 a year.

Valve plugs and seats, working in sand, oil and salt water, lasted only a few hours in service. Hard-faced by welding, a set cost \$155, lasted from 3 to 8 hours. When flame sprayed with tungsten carbide powder, service life was increased to a minimum of 2 weeks, 4100% longer! Cost of metallized set, \$73. But reduced downtime far outweighs the dollar savings.

A Connecticut job shop makes a very good profit when it flame sprays small



Any good mechanic can quickly master the three basic steps of metallizing: 1. prepare the surface; 2. flame spray; 3. finish.

shafts for \$27.50. The customer is happy, too—he formerly had to pay over \$50 to have shafts built up with welding.

The same job shop salvaged a big degreasing tank, value \$2,850, by flame spraying with zinc for \$683. The shop made money, the customer saved money.

A shipbuilding company installed metallizing equipment to repair such parts as pump rods, pistons, crank shafts for diesel engines, stern bushings, valve stems. A badly worn tugboat shaft, replacement cost \$3,000, was repaired and made better than new for \$400. That job alone more than paid for the METCO equipment.

From these cases you can see how modern metallizing pays, whether in plant maintenance departments or in job shops serving the many companies that

don't need their own installation. Wherever there's wear, in rotary or sliding action, there's an opportunity to save money and make money.

### New and improved materials

Among these new materials are a number of nickel, chrome, boron hard facing powders. Sprayed tungsten carbides are also widely used. Many others are available to give new values to the basic benefits of metallizing, which may be summarized as: less downtime; far less machining or grinding time, reduced parts inventory; and "better than new" performance of the metallized parts.

With savings like these there is plenty of leeway for good job shop profits and big savings for manufacturing plants. To learn more about these opportunities, check the coupon and send it off today.



**METCO INC.**  
FORMERLY METALLIZING ENGINEERING CO., INC.  
*Flame Spray Equipment and Supplies*

1115 Prospect Avenue, Westbury, L. I., New York Telephone: Edgewood 4-1300  
Cable: METCO. In Great Britain: METCO, Ltd., Chobham-near-Woking, England

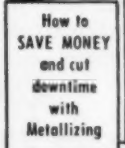
**METCO, INC., 1115 Prospect Avenue, Westbury, L. I., New York**

#### JOB SHOPS ONLY



- Send Bulletin 14, "How Job Shops Make Money With Metallizing"
- ☐ Send Business-Building Kit
- ☐ Have Field Engineer Call

#### PLANT MANAGEMENT



- Send copy of Bulletin 15, "How to Save Money and Cut Downtime with Metallizing"
- ☐ Have Field Engineer Call

Name \_\_\_\_\_

Title \_\_\_\_\_

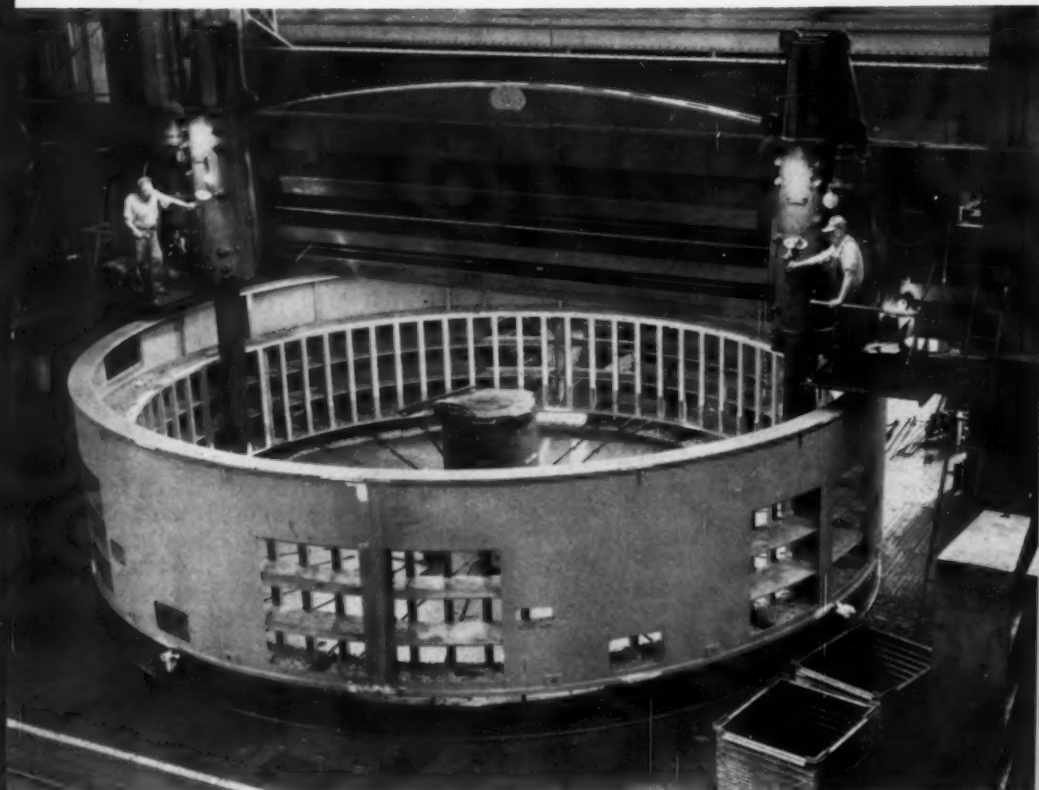
Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_

State \_\_\_\_\_



**Talk about interrupted cuts!** This gigantic synchronous generator stator yoke has 72 of them. It is being machined on a 40' vertical boring mill at Allis-Chalmers' West Allis Works.

When completed, this yoke will be used for the world's largest reversible pump-turbine by the Appalachian Power Co. for a dam project near Smith Mountain on the Roanoke River.

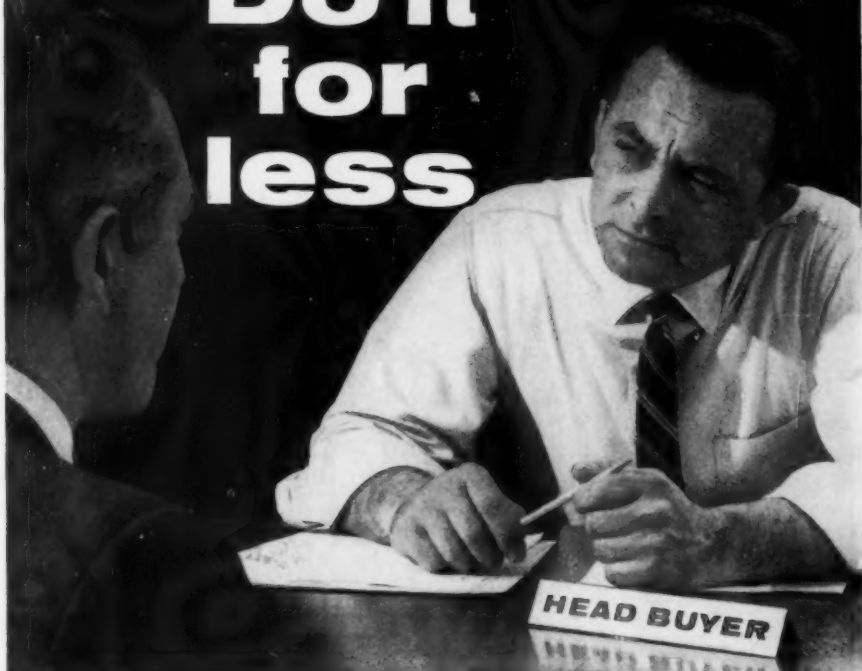
The yoke is one of two for reversible generator-motors rated 101,500 hp at 105.9 rpm, 95% pf, 13,500 volts as a motor, and 69,400 kva, 95% pf,

13,800 volts as a generator. The pump-turbines will have a rated capacity of 87,000 hp at 189' net head when generating and 4100 cfs at 197' total dynamic head when pumping.

Appalachian Power will use the reversible units to pump water from the lower to the upper storage reservoir during off-peak periods. When generating power for seasonal or daytime peak loads, the units will cause water to flow from the upper reservoir through the two pump-turbines into the lower reservoir. • • •

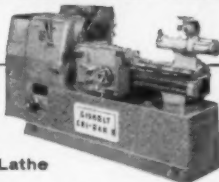


# Do it for less



## ON A CRI-DAN AUTOMATIC THREADING LATHE

### Gisholt CRI-DAN Model B Automatic Threading Lathe



Sets up in 8-15 minutes for maximum profits on job lots or long runs.  
Produces single- or multiple-start, standard or special form, left- or right-hand, straight or tapered, internal or external threads right up to shoulders, in a matter of seconds.  
Can combine threading with tracing and other machining during the automatic cycle.  
Provides top quality and fine finish in any material in a fraction of the time and/or cost required by milling, grinding, or special taps and dies.

Buyers can't afford to pass up a sales approach based on equipment that cuts threading costs 30-80%.

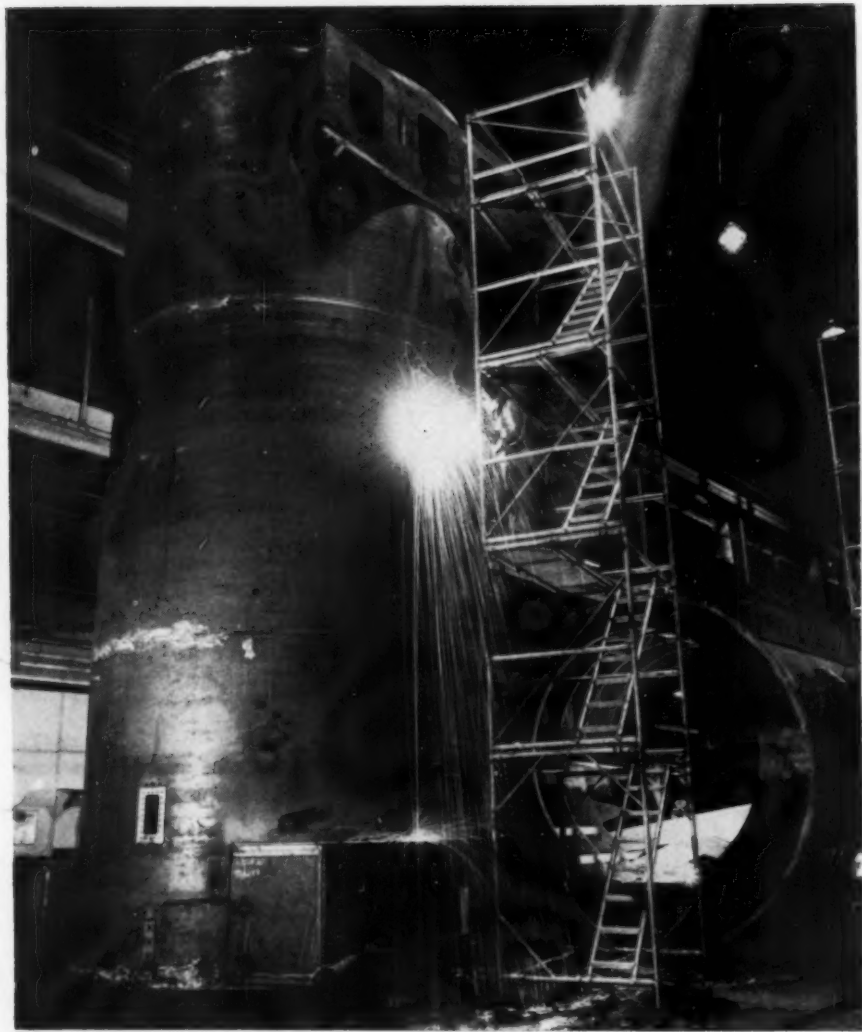
This advantage is attained with the Gisholt Cri-Dan Threading Method—that uses an inexpensive, single-point, carbide tool to cut *quality* threads in *any* material—*automatically!* Now, you can set up in 8-15 minutes and produce *any* type of thread in a matter of seconds. Accessories combine tracing and standard machining with threading for added savings. If you want to thread for less, call your Gisholt Representative or write for Catalog 1215.



**GISHOLT**  
MACHINE COMPANY  
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

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**This rough equivalent** of a Cape Canaveral launching site is actually a casing for a large generator, standing on end, nearly 30' high at the East Pittsburgh, Pa., plant of Westinghouse Electric Corp.

The metal scaffolding is supporting a welder. His torch and the sun's rays seem to be of equal intensity. When completed and installed, this generator, with its turbine, will produce 320,000 mw for the West Penn Power Co.

• • • • •

# INSPECTION PROJECTOR MAGNIFIES FOR **®** QUALITY...

Our inspection projector magnifies cutting edges to eliminate the minute angular deflection that could cause you costly production losses . . . just one of many inspections that account for Circle R quality.

CIRCLE R saws, slitters and combination center drills must submit to constant exhaustive inspection to work their way to you. They've got to prove they can ensure you correct cutting angles, long service, and minimal downtime.

Consult these CIRCLE R Specialists . . .

**BURBANK**  
Production Mach. Sales Inc.  
**CEDAR RAPIDS**  
McNeal Tool & Supply Corp.  
**CHICAGO**  
Donald Robertson & Co.  
**CLEVELAND**  
Production Tool Co.  
**DAYTON**  
J. R. Kautz Company  
**DETROIT**  
J. L. Bradford Associates

**HACKENSACK**  
The Exton Company  
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Donald McIntire  
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Tool Specialists  
**MILWAUKEE**  
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Humphrey B. Wolfson  
**NEW HYDE PARK**  
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**NEW YORK CITY**  
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General Tool Sales Co.  
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**CIRCULAR TOOL CO., INC.**  
PROVIDENCE 5, RHODE ISLAND  
Specialists in Circular Cutting Tools Since 1923

METAL SLITTING SAWS • COPPER SLITTING SAWS • SCREW SLOTTING SAWS • COMMUTATOR SLOTTING SAWS • JEWELERS' SLOTTING SAWS • CUT OFF SAWS • CIRCULAR KNIVES & ROTARY SHEAR BLADES • CIRCOLOY STEEL SAWS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS & COUNTERSINKS • CENTER REAMERS

**PROJECTION INSPECTED**

**CARBIDE TIPPED SAWS**

*Send for Catalog P Showing More Than 1200 Items*

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## THIS MONTH continued

**Drawing boards are conspicuously missing in this engineering room at T A B Engineers, Inc., Chicago, due to a panoramic design technique being shown in action.**

The method, which cuts engineering, design, and drafting costs from 33 to 50%, does away with the drawings made by using conventional drawing boards, parallels, and T-squares. Instead, engineers now put their designs directly on wall-size blackboards and record them photographically.

In conventional engineering practice, the individual designer makes drawings of his ideas on his own board, and then submits them for approval. In many instances, 10 or 20 engineers and designers work on parts of the same design at the same time. After the basic design has been developed, the work is turned over to detailers who

then spend hours preparing the detail and assembly drawings for use in making a pilot model.

With the T A B method, engineers and designers work together as a group at a huge blackboard. Each man is assigned a specific part to develop, and his ideas are constantly on display to the others.

The director of engineering or project manager can see the project in its entirety instead of inspecting individual drawings one at a time. If a change is indicated, it can be made just by erasing the chalk and sketching a new version.

When a satisfactory design is developed, a detailed drawing can be made immediately by the use of a plastic overlay which is already ruled and on which the engineer can sketch the other views and add dimensions.

• • •



# Allison-Campbell

## ABRASIVE CUTTING KNOW-HOW

ACCO  
For Better  
Values



### With this Campbell Machine, you can -- Cut 6-inch Diameter Hard Alloys in Less than 3 Minutes!

• This Campbell wet abrasive cutting machine—the Model 406—will cut tubing, bar stock, angle iron, or any other shape up to 6" round or square—and it will cut practically any material, including the new super alloys and exotic metals.

**High speed** • 4 to 8 seconds per square inch is normal wet abrasive cutting speed. Cut 6" diameter hardened steel in less than 3 minutes. **Accuracy** • Model 406 will cut 3" diameter material to lengths within  $\pm .010"$ , 6" diameter within  $\pm .030"$ . **Fine finish** • No burn, minimum burr. **Power oscillation** • Cutting wheel moves back and forth across cut as wheel is fed downward. Result—greater cutting capacity, longer wheel life.

**Proper coolant application** • Large reservoir, 33 gallon/min. pump, give high coolant volume. Unique Campbell distributor applies coolant equally to both sides of wheel—a requirement for accurate cuts.

**OTHER CAMPBELL MACHINES FOR ANY CUT-OFF NEED** • Choose from four types of Campbell machines for wet or dry cutting—chop stroke, oscillating, horizontal or rotary—with capacities up to 14" rounds, 12" billets, plate up to 6" thick and 20 ft. long.

*Write* for Bulletin DH-260 for details on the Model 406, or describe your cut-off application and we'll send you information on the proper Campbell machine.

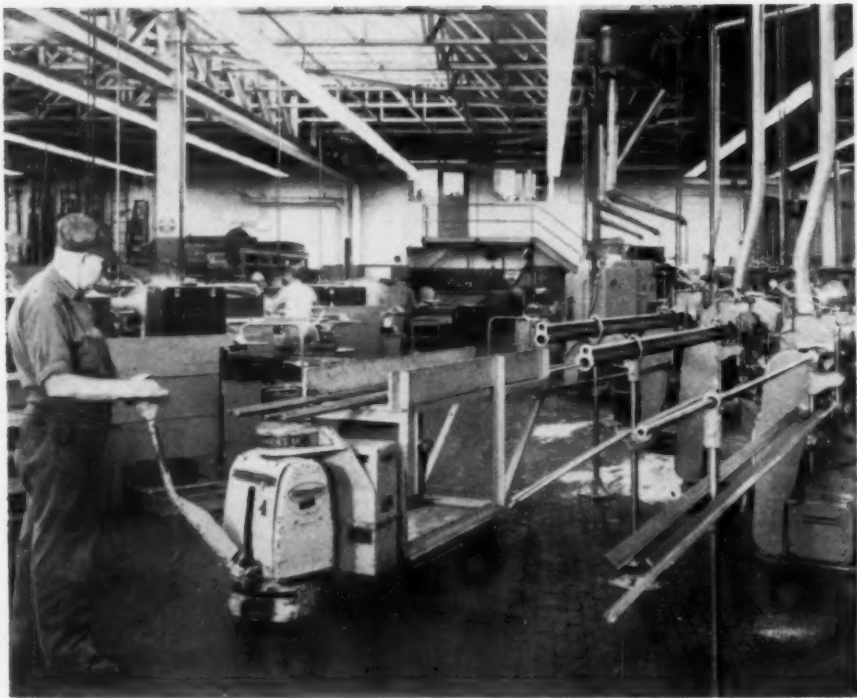


## CAMPBELL ABRASIVE CUTTING MACHINES

Allison-Campbell Division • American Chain & Cable Company, Inc.

937 Connecticut Avenue, Bridgeport 2, Conn.

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**No wrestling with bar stock here!** By attaching a table to the platform of an obsolete low-lift powerized truck, the Fisher Governor Co., Marshalltown, Ia., has increased the efficiency of bar stock delivery from the storage area to the screw machines. This operation was formerly handled by a non-motorized hand truck and required the screw machine operator to lift the stock from the floor and slide the bars into the machine.

The lift truck-table unit is just the right height to permit sliding the bar directly into the magazine from the table. Because the motorized truck is

faster than the non-motorized hand model, it can supply twice as many machines with bar stock during the same period of time.

An additional job for this "obsolete" transporter includes supplying bar to stock racks in the machine shop area.

• • •

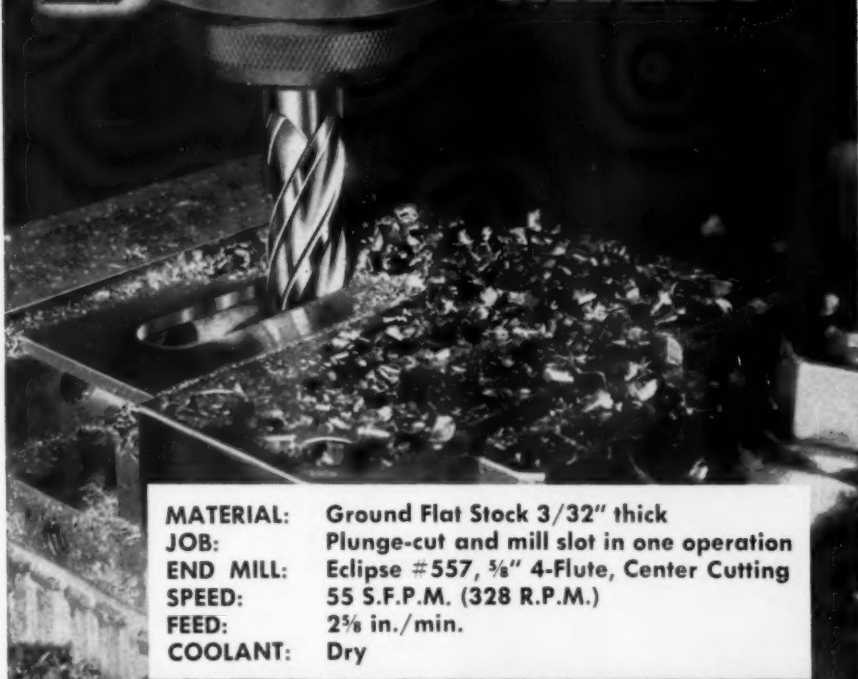
**Can you imagine two types of lubricating systems in one machine?** Both continuous and intermittent lubrication of different elements of a cylinder boring machine have been combined in a single automatic system. The machine rough bores the cylinders



**ACCURACY • ECONOMY • PERFORMANCE**

**Eclipse**

**END  
MILLS**



<b>MATERIAL:</b>	Ground Flat Stock 3/32" thick
<b>JOB:</b>	Plunge-cut and mill slot in one operation
<b>END MILL:</b>	Eclipse #557, 3/8" 4-Flute, Center Cutting
<b>SPEED:</b>	55 S.F.P.M. (328 R.P.M.)
<b>FEED:</b>	2 3/4 in./min.
<b>COOLANT:</b>	Dry

**WRITE FOR CATALOG EM-61**



**ECLIPSE COUNTERBORE COMPANY**  
END MILL DIVISION      DETROIT 20, MICH.

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## THIS MONTH continued

of engine blocks in the plant of a compact car manufacturer.

Lubrication is particularly vital to the six spindle bearings, which are subjected to the greatest amount of friction. The bearings must be constantly supplied with a metered amount of lubricant when the machine is in operation. Other parts—the ways, the work-holding fixture, and the counter-weight chains—require intermittent rather than continuous lubrication.

The Bijur dual output lubricator employed provides both continuous and cyclic flows by means of two outlets branching from a duplex gear pump. Cycle time, controlled by an adjustable cam, and discharge volume are preset. The amount of oil delivered is controlled by the size of the metering units at each point of application. The pump motor is actuated through the same switch as the machine's hydraulic system. • • •



**Steering a fast-moving blade in a straight line** while making difficult and intricate cuts in the toughest steel is usually a tricky job. But a unique servo-mechanism, similar to those used to guide missiles, does such a job and also assures extreme accuracy to tolerances of .005". This servo-unit can also be used to cut angles or mitres to any degree setting up to 45° right or left of vertical.

The mechanism, now incorporated in automatic band saws at Morrison Steel Co., is an electronic blade controller that has two carbide-tipped contact points in the sensing element. This sensing element is mounted on the upper guide heads.

As the contact points detect lateral departure of the blade from a straight line, this departure is mechanically amplified and the upper and lower guide arms pivot the blade guides about the tooth points as a fulcrum, thus steering the blade back into a straight line. • • •

# DeVlieg spiramatic jigmils®

AVAILABLE WITH  
**DUPLITROL®**  
PROGRAMMING  
**DIATROL®**  
DIRECT DIAL DIMENSIONING OR  
**TAPAC\***  
TAPE CONTROL



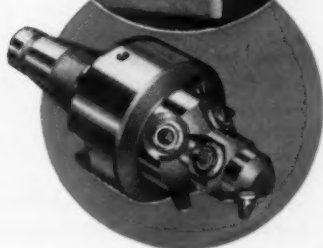
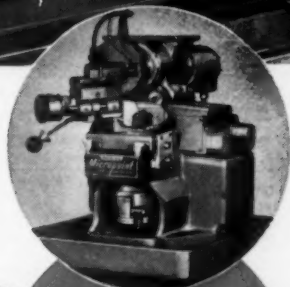
\*Trademark—De Vlieg Machine Company

## micropoint®

The first grinder in its field able to grind tool profiles geometrically correct to gage room accuracy.

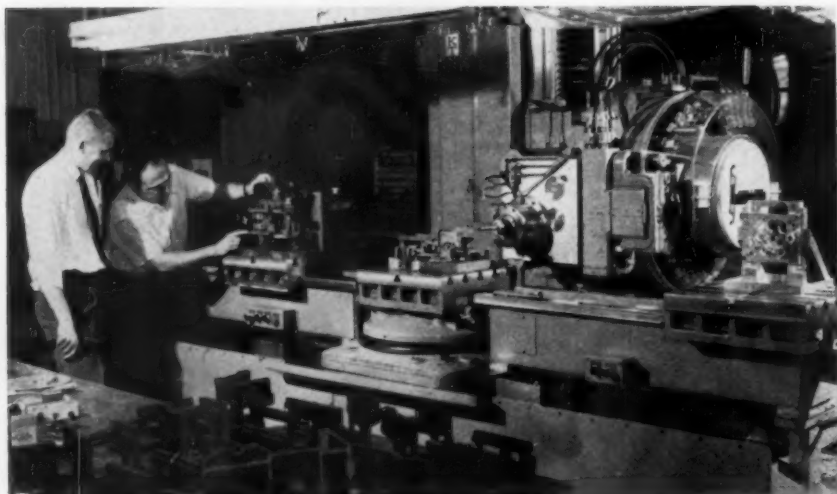
## microbore®

The complete tooling system with over 300 Standard Single Point Tool Applications from stock including Carbide, Ceramic and High-speed Steel Tips • Special Cluster Tooling • Flash-Change Tooling • Microface Adjustable Blade Facing Heads • Microbore Tooling with Kendex "throw-away" Inserts • Ceramic Tipped Cutting Tools.



DEVLIEG MACHINE COMPANY, FAIR STREET • ROYAL OAK, MICHIGAN

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#### **Numerical Control Job Shop Opens in Minneapolis**

A job shop, Numeric Machining Inc., employing a numerically controlled Kearney & Trecker Milwaukee-Matic, recently opened at 2309 Snelling Ave., Minneapolis, Minn.

With this highly versatile machine, the new company is offering a complete manufacturing service. It also offers a control tape preparation service.

The firm is the last addition to a group of Minneapolis enterprises all formed by Elmer Hanks (right). Numeric is headed by Dan Stenoien (left), former Kearney & Trecker sales manager.

#### **Diamond Development Lab. Now in Operation at G.E.**

A diamond application development laboratory has been put into operation by the Metallurgical Products Department of General Electric Co., Detroit.

The facility has been set up to investigate new and improved diamond applications, to evaluate new G.E. man-

made diamond types, and to analyze comparative performance testing operations.

E. L. Kapernaros has been named to manage the laboratory.

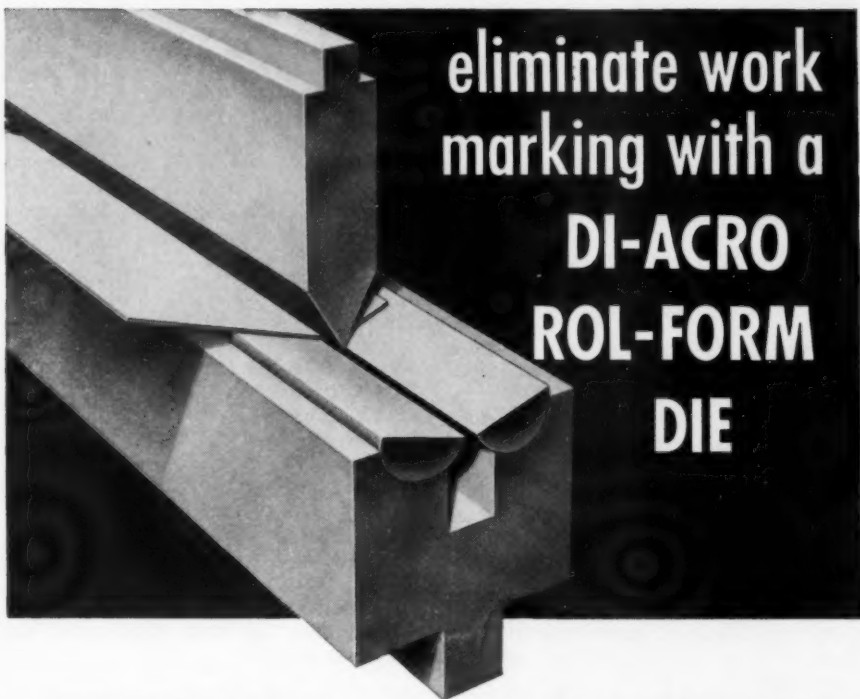
#### **Robbins & Myers Announces New Airtrol Division**

Robbins & Myers, Inc., Springfield, Ohio, has announced the formation of a new division known as the Airtrol Division. It will be located in Springfield.

Airtrol will specialize in the design, production, and marketing of unit-type collectors for the control of dusts and mists encountered in industrial and commercial operations.

This line will include a fabric filter-type collector and a kinetic cyclone-type collector. Both units will be suitable for controlling all common industrial dusts and will clear the air of particles as small as sub-micron sizes.

E. J. Stone, sales manager of the firm's Propellair Division, has been named manager of Airtrol.



# eliminate work marking with a **DI-ACRO ROL-FORM DIE**

Workmarking from forming sheet materials in press brakes and punch presses is greatly reduced and in many metals completely eliminated when formed with the Di-Acro Rol-Form Die. Hardened and Precision ground rolls pivot smoothly in the die block to fold material without strain. You save costs by discarding elaborate and time consuming preparation and work methods, reducing polishing time, eliminating scrap parts. You also cut costs in press brakes and punch presses by reducing the number of dies needed and reducing set-up time.

One Di-Acro Rol-Form Die with a 60° upper die forms any angle to 60° and any thickness of metal to  $\frac{1}{8}$ " just by adjusting the ram or bed of the brake. Where ultra-high finish material is to be formed, nylon inserts can be used in the die block to further reduce the possibility of work marks.

The Rol-Form Die is offered in five styles and in lengths from 6 inches to 12 feet for use in all sizes and models of press brakes and punch presses.

For ordinary press brake forming ask about Di-Acro Standard Press Brake Dies.



*pronounced die-ack-ro*



Consult the yellow pages of your telephone book under Machinery-Machine Tools for the name of your nearest Di-Acro distributor or write us.

## **DI-ACRO CORPORATION**

formerly O'Neil-Irwin Mfg. Co.

6012 Eighth Avenue, Lake City, Minnesota

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## THIS MONTH continued

### **Cavitron Merges with Subsidiary**

The Cavitron Corp., Long Island City, N.Y., has announced the merger of the corporation and its wholly-owned subsidiary, Cavitron Equipment Corp. Name of the new company is Cavitron Ultrasonics, Inc.

### **Machine Tool Distributors Name Officers and Executives**

Irvine B. Rabel, president of Star Machinery Co., Seattle, Wash., has been elected president of the American Machine Tool Distributors' Association. The announcement was made at the Association's 37th annual meeting in Pittsburgh.

Other officers named were: C. Denson Day, president of Machinery Associates, Inc., Wynnewood, Pa., as vice-president; William L. Walker, president of Walker Machinery Co., Cincinnati, Ohio, as second vice-president; and Robert W. Nissen, president of The

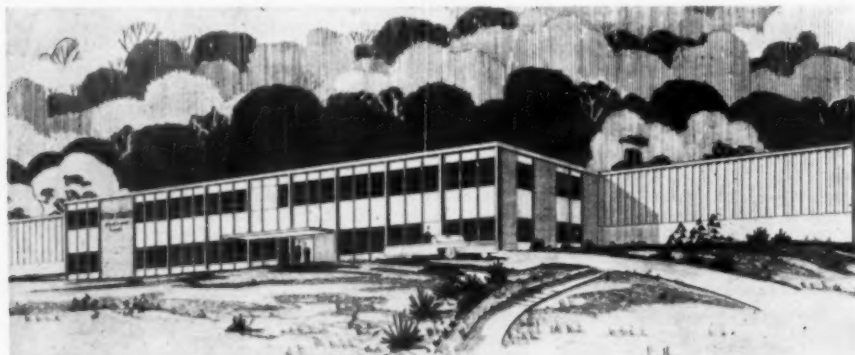
E. L. Essley Machinery Co., Chicago, Ill., as secretary-treasurer.

Elected to the executive committee were: Robert A. Brechter, vice-president and secretary of the Vandyck Churchill Co., New York, N.Y.; Phil R. Hoffman, vice-president of Hoffman-Marquard Machinery Co., St. Louis, Mo.; and John L. Addy, Jr., a partner in the Addy and Luby Machinery Co., Detroit, Mich.

### **Tannewitz Works Changes Hands**

The Tannewitz Works, Inc., Grand Rapids, Mich., which for 71 years has specialized in the manufacture of sawing machinery, has been acquired by Marvin R. Elenbass from Carl E. Tannewitz, principal stockholder and former president of the corporation.

Oliver DeGroot, Tannewitz vice-president and factory manager, will remain with the new organization in the same capacity.

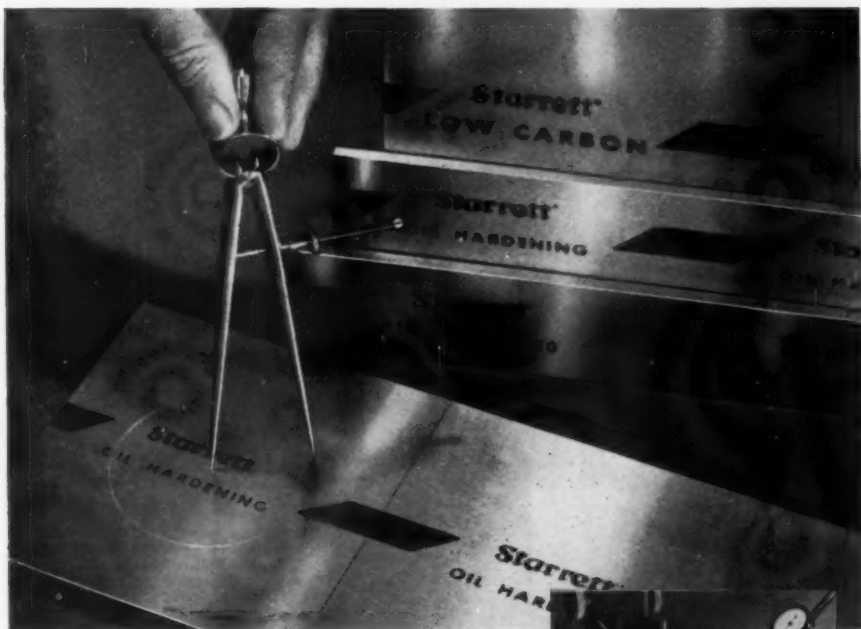


### **Standard Electric To Build**

The Standard Electrical Tool Co., Cincinnati, Ohio, has let contracts for a new office and factory building. Construction has already begun on a 40,000 sq. ft. building located on the west

side of Cincinnati, overlooking the Ohio River. The 28-acre plot on Hillside Ave. will afford ample room for future expansion. The new plant should be ready for occupancy early in 1962, the firm's 50th anniversary year.





PRECISION GROUND DIE AND FLAT STOCK — Starrett No. 405 Oil Hardening, No. 407 Air Hardening and No. 408 Low Carbon Flat Stock.

every inch identified  
as **Starrett®** quality and precision

There's no mistaking the quality and precision of Starrett flat stock and die stock . . . each piece is made to exacting Starrett metallurgical specifications and precision ground to Starrett standards of dimensional accuracy.

And there's no mistaking the type of steel because each piece is clearly identified by color and name over the full length. Available in a wide range of sizes in air, oil and water hardening tool and die steel types and in free machining-low carbon flat stock. Individually packaged in distinctive, rust-inhibiting, protective envelopes.

Your nearby Industrial Supply Distributor is your best source for prompt delivery, dependable service and quality products. Call him or write for Catalog No. 27 showing the complete Starrett line. The L. S. Starrett Company, Athol, Massachusetts, U. S. A. Dept. B



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PRECISION TOOLS

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# B

# A

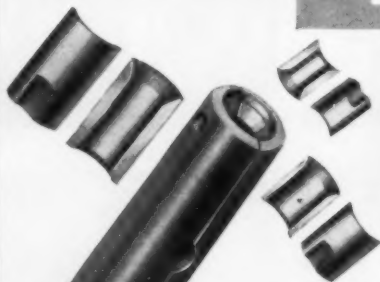
# L

# A

# S



In plant after plant, the use of Balas Solid Carbide Pusher Pads with Balas Master Pushers has resulted in tremendous reduction in scrap and substantial savings in down time. Balas Carbide Pusher Pads quickly pay for themselves in improved performance, increased production.



The Dial Adjustable Tension Master Pusher illustrated above permits infinite adjustments from the lightest to the heaviest tension. The Model "A" Master Pusher is furnished permanently tensioned to your specifications. Find out about this economical, productive tooling now; write for catalog.

## BALAS

COLLET MANUFACTURING CO.  
CLEVELAND 14, OHIO



● KEEP YOUR OPERATING COSTS  
WHERE THEY SHOULD BE!

● ELIMINATE DELAYS!

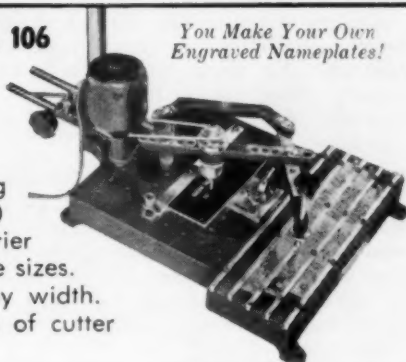
## **GREEN** Pantograph Engravers

### **MODEL D-2 HEAVY-DUTY 2-DIMENSIONAL** Pantograph for milling, drilling and engraving.

Vertical adjustment of copy table automatic with Pantograph. Features: unobstructed on 3 sides to take large work; micrometer adjustment for depth of cut; ball bearing construction throughout; spindle speeds up to 26,000 rpm for engraving or machining; vertical range over 10"; ratios 2 to 1 to infinity — master copy area 26" x 10".

### **PORTABLE 40-POUND BENCH MODEL 106**

Here is a speedy, economical 2 or 3-dimensional engraver used by thousands of dollar-conscious companies. It features 5-positive, accurate pantographic ratios; ball bearing spindle with 3 speeds up to 14,000 rpm. Is supplied with one copy carrier that accepts all standard master type sizes. Will actually work up to 10" by any width. Height of pantograph and position of cutter are continuously adjustable.



*You Make Your Own  
Engraved Nameplates!*

### **MODEL D2-201 PNEUMATIC ATTACHMENT**

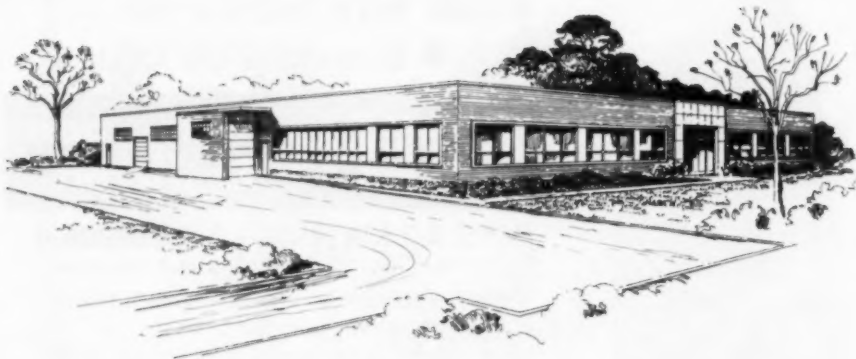
for use with Model D2 Pantograph Engraver to rapidly drill holes in printed circuits by tracing templates. Drills as many as 100 holes per minute. Equipped with foot switch; spindle air cylinder; regulating valve and pressure gauge; filter and oiler. It's ready to use as soon as it's attached to an air compressor.

Write or call for full  
details and prices.

## **GREEN INSTRUMENT COMPANY, INC.**

Dept. 86, 295 Vassar St., Cambridge 39, Mass. Tel. Eliot 4-2989

Use postpaid card. Circle No. 218



### **Precious Metal Fabricator Relocates N.Y. Plant**

Handy & Harman, fabricators and refiners of precious metals, has relocated its New York plant to 525 Nuber Ave., Mt. Vernon.

Modern and improved machinery has been installed in the new plant to facilitate the production of a wide variety of karat gold alloys for manufacturing jewelers and industrial users.

### **DeVlieg Has Conner Spade Drills**

The Microbore Division of DeVlieg Machine Co., Royal Oak, Mich., is now manufacturing and distributing Conner type spade drills. Tools of this type were formerly produced by Gairing Tool Co., which recently ceased operations.

The new DeVlieg line includes what are known as X and Y type spade and core drills, as well as holders.

### **Holden Moves to New Plant**

The Detroit facilities of the A. F. Holden Co., manufacturers of heat-treating furnaces, salt baths, and process equipment, have been transferred to the company's newly erected plant at Milford, Mich.

This plant has been expanded to

accommodate offices for engineering, sales, and administrative personnel, a research laboratory, and new manufacturing facilities.

### **Producto Machine Co. Expanding**

Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn., is expanding with a 20,000 sq. ft. addition to its present facilities. The company is engaged in the manufacture of die sets, die makers' accessories, and special machinery.

### **E. W. Bliss Co. Consolidates Two Ohio Operations**

E. W. Bliss Co., Canton, Ohio, has consolidated its Salem and Canton operations into a single heavy equipment division. George Perrault, Jr., present vice-president and manager of the Salem division, will manage the new division with headquarters in Salem. Corporate headquarters for the Bliss firm will continue to be located in Canton.

Production of the new division will include the company's complete line of rolling mill equipment, heavy mechanical and hydraulic metalworking presses, custom machinery, and special contract items.

## IT'S A FACT!

### DRILLHEADS

ARE OBVIOUS.

Tremendous economies from the use of multiple-spindle drillheads are obvious. Drilling one hole at a time cannot be tolerated in this day of automation!

THOMSON

### THRIFTMASTER

Drillheads  
are your best Drillhead buy...

1. They are better built and cost no more (Full ball bearing construction, hardened gears, spindles and driver, and precision grinding!)
2. This means they last longer
3. This eliminates down time
4. This eliminates production losses
5. This drastically reduces drilling costs

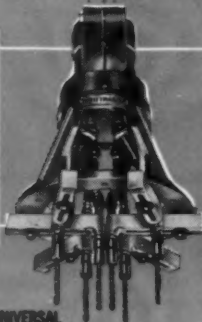
THOMSON

### THRIFTMASTER

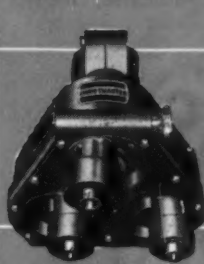
Drillheads are designed and produced by engineers whose experience in this specific field dates back to 1923. This long accumulation of engineering technique and production "know-how" is reflected in our product—a quality tool...solid, substantial and dependable!



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ADJUSTABLE



ECCENTRIC  
ADJUSTABLE



DOUBLE  
ECCENTRIC  
ADJUSTABLE

DRILL • TAP  
REAM • BORE  
COUNTER - BORE  
COUNTER - SINK  
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makers of BALL BUSHINGS • NYLINERS • 60 Case Shaffing



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#### **Kearney & Trecker Consolidate**

Kearney & Trecker Corp., Milwaukee, Wis. machine tool firm, will vacate its main plant facilities during the next year in a consolidation program which will see the company move its entire operation under one roof at the present Highway 100 plant. This plant was built in 1952 to house the special machinery division.

President Francis J. Trecker said that about \$3 million would be spent in making the change-over, most of which would go for new manufacturing space and material handling facilities, and a new office wing.

#### **Lloyd Tool Has New Plant**

Lloyd Tool Corp., Pasadena, Calif., has moved into a new plant at 1222 N. Fair Oaks Ave., Pasadena. Lloyd manufactures mist coolant generators.

At the new plant, the company will expand and feature the manufacturing of soluble oil coolants without objectionable odors for its mist coolant systems.

#### **Precision Plating Department Formed at Bunting Brass**

The Bunting Brass and Bronze Co., Toledo, Ohio, has formed a precision plating department to perform close-tolerance plating of sleeve bearings and other parts by either the electrolytic or immersion process. The department will be headed by Elmer T. Blackney.

#### **American Metal Climax to Enlarge Copper Facilities**

American Metal Climax, Inc., New York, will invest \$1,755,000 in the construction of new melting, casting, and handling facilities to increase production of OFHC brand copper at the U. S.

Metals Refining Co., Carteret, N.J., a subsidiary of American Metal.

OFHC copper is produced by direct conversion of refinery cathodes under conditions which prevent contamination of the pure oxygen free metal during the process.

#### **Pratt & Whitney Offices to Have Tape Preparation Facilities**

Small shops and newcomers to numerical control who purchase Pratt & Whitney's new Tape-O-Matic numerically-controlled single-spindle drill (see page 141) will be able to easily obtain prepared tapes because P&W is installing tape preparation equipment in its offices located in six major cities.

Complex tapes will be prepared quickly on an IBM 1401 computer located at the home office. Instantaneous teleprocessing links connect the centers with the master processing center.

#### **Norton Vice-President Dies**

Howard J. Daly, 64, vice-president and director of Norton Co., Worcester, Mass., died suddenly Oct. 7 at Niagara Falls, N.Y. He also served as general manager of Norton's electric furnace plants at Chippawa, Ontario; Cap-de-la-Madeleine, Quebec; and Huntsville, Alabama.

Mr. Daly had been with Norton since 1922 when he joined the company as a quality control engineer. He successively served as assistant superintendent, superintendent, works manager, manager, and general manager of the electric furnace plants. He was elected a director in 1954 and became a vice-president in 1956.

More news on page 230



cut-off  
faster  
cooler  
longer

Standard holders  
are available  
from stock  
for any machine  
using  
cut-off blades.



## Empire cut-off blades

### FASTER CUTTING

Empire (Luers Type) cut-off blades are precision ground on all surfaces to assure sharper, faster-cutting edges. Also, because their design requires grinding of front face only when re-sharpening, cut-off production is consistently increased throughout the long blade life.

### COOLER CUTTING

Hollow ground top of Empire blades causes chips to collapse and thus eliminate heat-generating friction on side walls of the cut. Also, by causing chips to collapse, a greater flow of coolant

can reach the blade cutting edges and cooler cutting is obtained.

### LONGER CUTTING

Longer blade life on every cut-off job is assured by: finest engineered blade design that precludes excessive friction or heat generation; wide selection of blade materials that permits use of best material for each cut-off job; simplicity of resharpening (only the front face of blade is reground) prevents grinding away blade life.

### Widest range of blade materials permits selection of best blade for each cut-off job

Empire Cut-Off Blades are available in the following materials: four grades of H. S. Steel (high-cobalt, high-vanadium); non-magnetic, solid cast-alloy (non-ferrous, cobalt-chromium-tungsten) having high red-hardness and superior abrasion resistance; and four grades of carbide for carbide tipped blades.



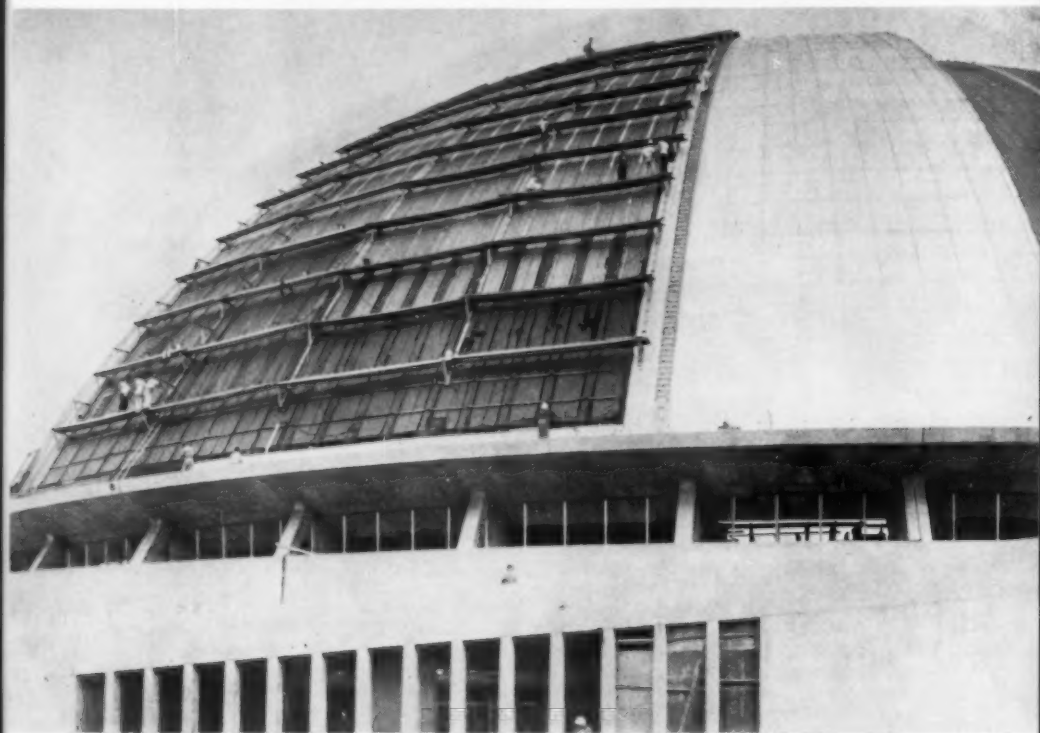
Made under license issued by John Milton Luers Patents, Inc.

EMPIRE TOOL COMPANY • 11500 LAMBE ROAD • MEMPHIS, MICHIGAN

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# BB

## What's New in Materials



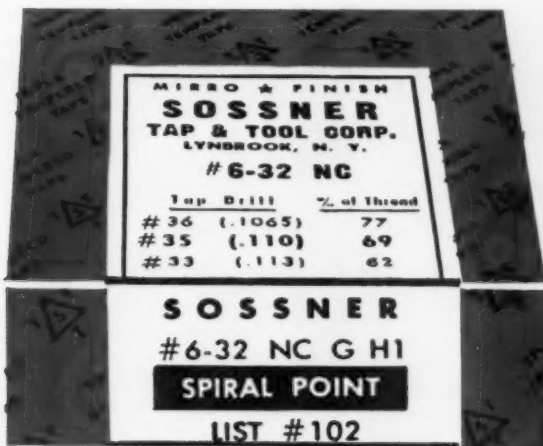
Sheet metal workers, installing the stainless steel roof on the Pittsburgh Auditorium, are dwarfed by the huge size of this unique structure. Section at right is completed.

### **World's Largest Dome Has Stainless Steel Roof**

This vast stainless steel roof on the dome of the Pittsburgh Public Auditorium is a batten-seam system. It covers 168,000 sq. ft. Some 7,580 stainless sections of 20 and 22-gage, Type 302 with a No. 2D special finish were notched, sheared to size, and brake-formed at the edges before being shipped to the

Each sheet was lock-seamed horizontally. While on vertical edges, standard batten seams were used. The entire fabricating and erecting job was performed by Limbach Co., Pittsburgh.

The structure will provide the city of Pittsburgh and Allegheny County with a versatile civic arena capable of



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**TAP & TOOL CORPORATION**  
**27 Broadway, Lynbrook, L.I., N.Y.**

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Two layers of rigid insulation and roofing felt were installed on the roof over a Robertson deck. Batten bars were fastened to receive the vertical seams of the stainless. Then horizontal seams were fastened (as shown) to the wood nailer with stainless cleats.

accommodating nearly 14,000 spectators. A unique feature of the auditorium is its huge push-button roof. Measuring 415 ft. in diameter and 136 ft. high at the center, it is divided radially into eight 45° sections. When the roof is retracted, six movable sections or leaves, will glide over the two fixed sections and open the giant arena to the sky.

After the sheets arrived at the job, two layers of rigid insulation and roofing felt were installed over the Robertson deck. The batten bars were then fastened in place to receive the vertical seams of the stainless. Horizontal seams were fastened to the wood nailer with 22-gage stainless cleats. A 20-gage batten cap was then fitted over the vertical seams where they enter the batten bar, with stainless screws placed 15" on center throughout the length of the cap to hold it in position.

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### Large Pure Tungsten Crystals

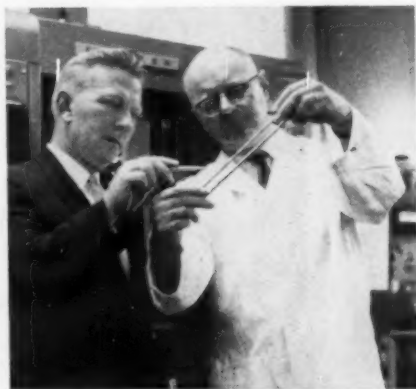
A practical method for producing large high-purity, high-density, single crystals of tungsten has been developed by Westinghouse Electric's Lamp Division, Bloomfield, N.J.

New refining techniques make it possible to grow single tungsten crystals as large as 10" long and .22" in diameter with a purity of 99.9975%. Such crystals are large enough for small parts to be fabricated from them.

Although tungsten is usually considered a hard, brittle metal that is difficult to machine or fabricate, the ultra-pure single crystals are actually ductile, even at temperatures as low as -330°F.

Tungsten sheets that are 3' long, 1½" wide, and 5 mils thick have been cold rolled from a single crystal. Wire as fine as 30 mils in diameter has been drawn.

Shown are C. O. Young, manager of



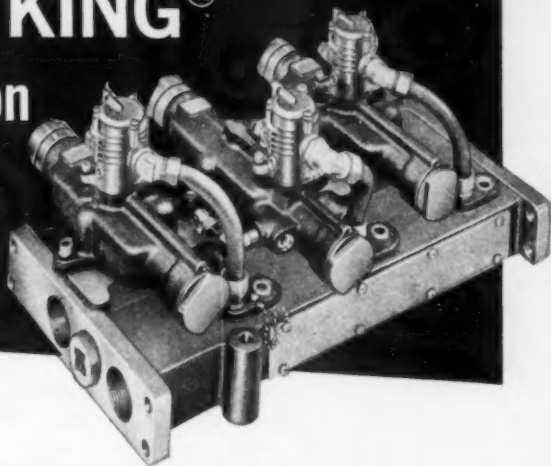
the Westinghouse lamp parts department (left), and Dr. R. H. Atkinson, lamp parts engineering manager, as they examine tungsten rods 10" long and .2" in diameter.

Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa.

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# SPEED KING<sup>®</sup>

## Deceleration Manifold



***...for positive  
cushioning  
of high speed transfer units***

The Speed King deceleration manifold controls double-acting cylinders on automated equipment moving masses weighing several hundred pounds . . . where rapid travel and precise, easily regulated cushioning, at any point in either or both directions, is required.

Controlled by limit switches, the deceleration unit permits rapid initial cylinder travel . . . then restricts cylinder exhaust to provide desired rate of cylinder cushioning. And, if needed, live air can be introduced momentarily to the exhaust side of the cylinder for added deceleration and cushioning.

Rapid travel keeps production rates high . . . controlled deceleration and positive cushioning prevent damage to mechanisms . . . protect valuable dies and tooling.

Your Bellows-Valvair Field Engineer can advise you on control of large, fast-moving reciprocating units. Call him today.

8199

Write for Bulletin MAN-11. Address: Bellows-Valvair, Akron 9, Ohio, Dept. MTB-1261.

# Bellows-Valvair

AKRON 9, OHIO

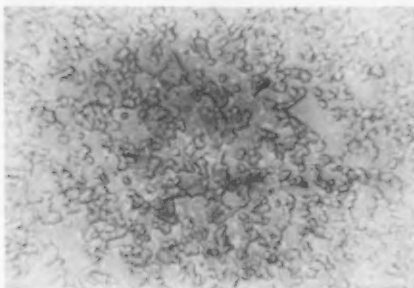
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

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### **Cemented Carbide Production Increases Tool Performance**

A metallurgical technique in the production of cemented carbides is resulting in increased tool performance on the machining of silicon iron laminations for use as rotors in electric motors.

Using the NewBide N80, cutting speeds on highly abrasive silicon iron were increased from 300 sfm to 600, and then to 750, with no smear or distortion of the laminate, or carry-over of burrs into the bar slots.



NewBide is produced in four grades (N50, N60, N70, and N80) for use on steel, and a fifth (N20) for cast iron and nonferrous materials. It is made of the same basic ingredients as those in conventional cemented carbides. These are tungsten, titanium, tantalum, columbium, cobalt, and iron.

Newcomer Products, Inc., Latrobe, Pennsylvania.

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### **Tellurium Added to B1112 Increases Machinability 3-1/2 Times**

The addition of tellurium, a relatively rare element, to B1112 machine steel increases its machinability over 3½ times, according to findings by LaSalle Steel Co. The firm is marketing its new tellurium steel under the name, "La-Led X." Speeds over 600 sfpm were reached during tests conducted at the Cone Automatic Machine Co.

plant in Windsor, Vt., on the machining of spark plugs shells. Tool wear was found to be normal, drills showed no appreciable wear.

Tellurium (Te) is a chemical element, a member of the sulphur-selenium family, first extracted in 1798. It is found in copper sulphide, gold, and silver-lead-zinc sulphide ores. This element has been used by the electrical industry for thermo-electric devices and semi-conductors.

LaSalle Steel announced that the cost for the tellurium addition will be \$15 per ton above the steel without tellurium.

LaSalle Steel Co., 1420 150th St., Hammond, Ind.

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### **Columbium Base Alloys**

Two columbium base alloys for use in space-craft and missiles are now available at the Du Pont Metals Center in Baltimore, Md.

The alloys were developed to aid space vehicles re-enter the earth's atmosphere at high speeds. The demand is growing for materials able to withstand friction heat up to 2700°F. which is associated with re-entry.

Du Pont's columbium alloys, D-14 (a binary containing zirconium) and D-36 (a ternary containing titanium and zirconium), can be readily fabricated and coated by normal methods. They retain useful strength at temperatures above 2500°F. They are specifically designed to maintain high strength after heat treatment associated with the application of coatings. Both can be welded to form ductile weld joints.

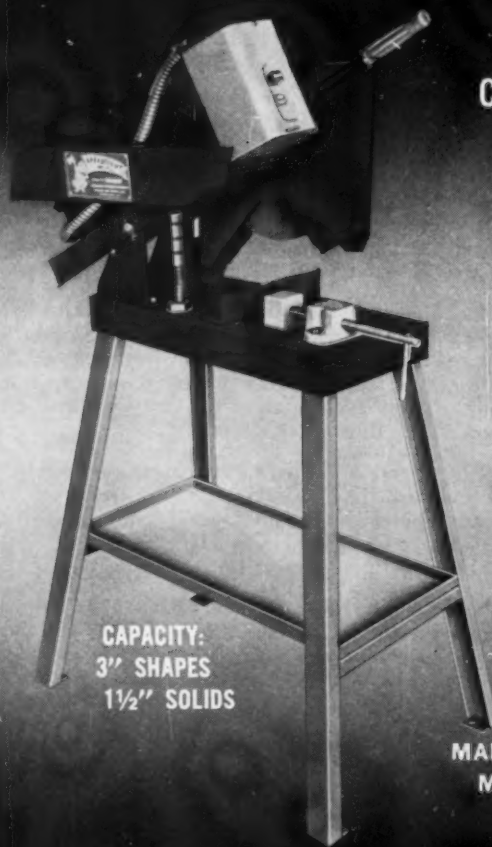
The alloys are produced in various mill shapes, including sheet, in widths up to 28" and gages down to 10 mils, and coiled strip up to 24" in width and down to 10 mils.

E. I. Du Pont de Nemours and Co., Inc., Wilmington 98, Del.

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# New! No. 11 Speed Cut



CAPACITY:  
3" SHAPES  
1½" SOLIDS

**A BUDGET-SIZE  
CUTOFF FOR EVERY  
SIZE SHOP!**

**FAST!  
POWERFUL!  
ECONOMICAL!**

**PRICED SO LOW  
YOU CAN'T AFFORD TO  
BE WITHOUT IT!**

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**MANUAL OR POWER-OPERATED  
MODELS FOR WET, DRY OR  
ANY-ANGLE CUTTING!**



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**BEAVER PIPE TOOLS, INC.**

**DANA AVE.**

**WARREN, OHIO**

# BB

## Catalogs . . . Manuals . . . Bulletins

Yours without charge!  
Just circle the identifying number  
on one of the prepaid Action Cards



See Number 1



See Number 2



See Number 3

**1. Mechanical Differentials.** Brochure covers mechanical differentials including design. Also contains a group of stock and pre-engineered differential drawings and a test report on an actual stock differential. Unusual feature is a special perforated tear-out section of 27 drawings, ready for reproduction. Dynamic Gear Co., Inc., Amityville, N.Y.

**2. Boring Machine Attachments.** A 12-page catalog on the Ex-Cell-O line of attachments and accessories for its precision boring machines. Included are 15 varied tool and work holding, indexing, and positioning devices, and cycle assists. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

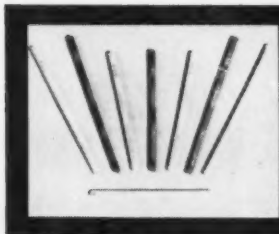
**3. Air-Cylinders.** A 50-page catalog on the SQUAIR HEAD cylinder line of The Tomkins-Johnson Co. includes technical dimensions and engineering data for the company's cylinders in 1½" through 14" bore sizes. The Tomkins-Johnson Co., Jackson, Mich.

**4. High-Speed Steel and Carbide Drills.** This 48-page catalog covers the Besly-Welles line of HHS and carbide drills. Included are reamers, end mills, counterbores, tool bits, and cut-off blades. Besly-Welles Corp., South Beloit, Ill.

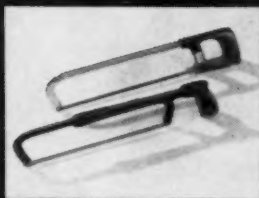
**5. Guidance Machines.** A catalog on the latest in transistorized control systems which can be applied to a vast range of metalworking processes, such as oxygen-flame cutting of steels, powder cutting of nonferrous materials, and automatic arc welding and cutting. Heath Engineering Co., Ft. Collins, Colo.

**6. Abrasive Belt Grinders.** A 20-page catalog on an abrasive belt grinder which can be used on grinding, polishing, buffing, and deburring operations such as internal, flexible belt, platen, contour, and contact wheel. Hammond Machinery Builders, Kalamazoo, Michigan.

**7. Die Tryout Presses.** Catalog describes a line of



HAND HACK SAW BLADES



HACK SAW FRAMES



POWER HACK SAW BLADES

## IS EVERYBODY'S HALO ON STRAIGHT?

We agree that most of the bombastic claims and counter-claims about brand superiority in metal cutting products are just so many words. All of the several top brands—including Victor—are extremely close in price and quality, and more and more buyers are recognizing this fact. There are *some* differences of course, but they hardly rate claims like, "best buy," "longer lasting," or "cleanest cutting in the field."

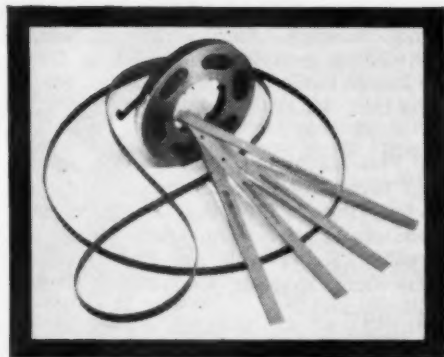
For our part, we do not attempt to out-yell our competitors... and the low noise level is not the only benefit accruing to you from this policy. More importantly, you can be absolutely certain that every Victor product you purchase from your local Victor distributor will do *exactly* what he and we say it will do.

Fair price, prompt delivery, and product backing do not have to be talked up either... they're facts of life with Victor, and our distributors.

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HOLE SAWS  
FILES



BAND SAW BLADES



VICTOR SAW WORKS, INC.  
Middletown, N. Y.

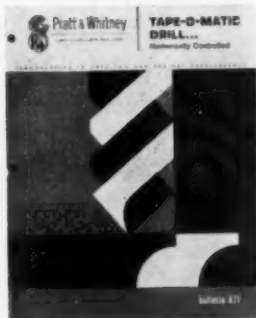
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See Number 9



See Number 10



See Number 11

standard rotary head die tryout presses explaining design advantages that make both die members accessible for finish operations without disturbing tryout press setup. Alpha Press and Machine, Inc., 9281 Freeland, Detroit, Mich.

**8. Continuous Feed Boring and Facing Heads.** A 12-page catalog on the "GF" continuous feed heads for boring, facing, turning, backfacing, recessing, threading, grooving, and grinding. Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

**9. Flat Machining Applications.** Bulletin covers the speedlap process for flat machining. It combines high production stock removal rates with precision quality found only in flat lapping. Abrasive Systems Co., 3636 Oakton St., Skokie, Ill.

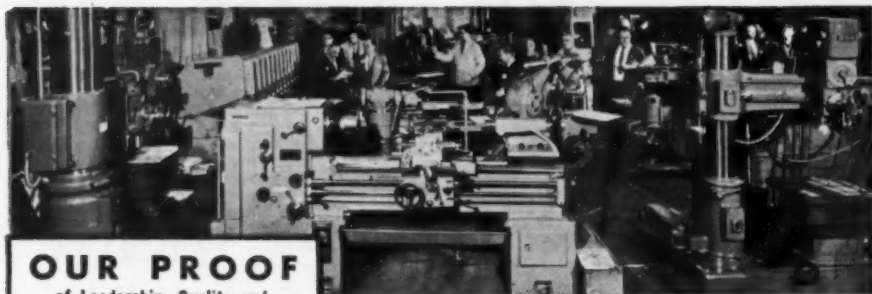
**10. Hydraulic Expanding Tools.** Bulletin on hydraulic expanding arbors, chucks, and gages, said to eliminate chucking errors and provide positive location by hydraulic expansion of arbors and male gages and hydraulic contraction of chucks and female gages. A & C Engineering Co., 12024 E. Nine Mile Rd., Warren, Mich.

**11. Numerically Controlled Drill.** A bulletin on the P & W Tape-O-Matic numerically controlled drill. This single-spindle unit conforms to all NMTBA and EIA specifications on control constructions, tape sizes, and tape reading. Pratt & Whitney Co., Inc., Charter Oak Blvd., West Hartford 1, Connecticut.

**12. 25-Ton Automatic Press.** Catalog sheet on an all-steel 25-ton automatic press including operational information and safety devices. Havar Mfg. Co., 444 N. Cleveland Ave., St. Paul, Minn.

**13. Standard Cutting Tools.** A 16-page catalog covering standard cutting tools including combined drills and countersinks, keyseat cutters, arbor-type keyseat cutters, cutter reamers, lathe mandrels, and machine countersinks. Keo Cutters, Inc., 25040 Easy St., Warren, Mich.

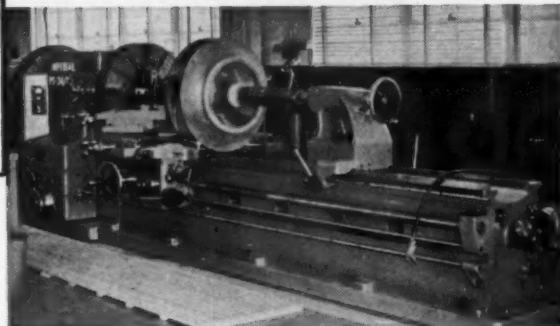
**14. Automatic Controls for Electrolytic Machining.** Booklet tells how automatic controls simplify electrolytic machining techniques. Anocut Engineering Co., 631 W. Washington Blvd., Chicago 6, Illinois.



## OUR PROOF

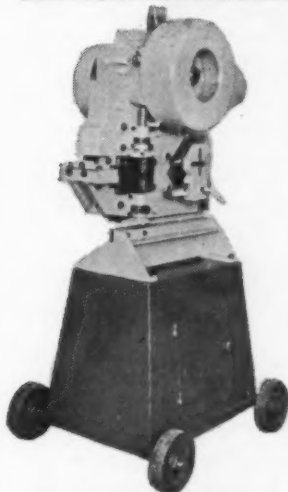
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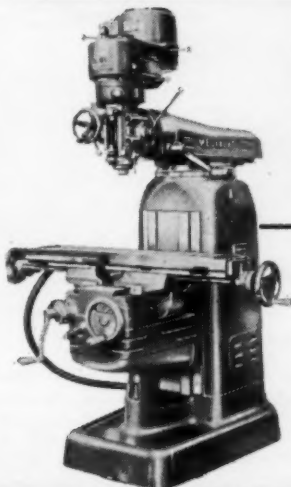
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Compound "Knuckle Joint," 12"  
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table. Power feed to table mea-  
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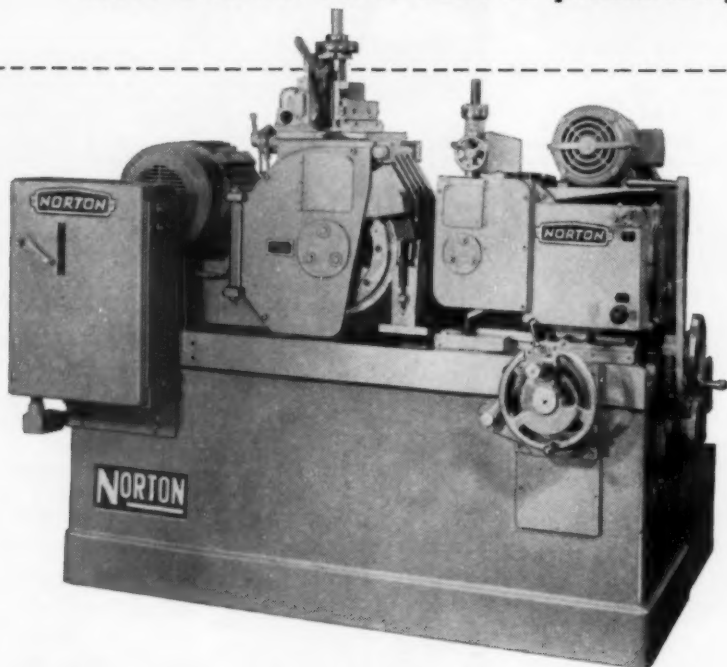
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# ***SOLID SUPPORT for the "Touch of Gold"***

***The Norton No. 2 Straddle-Bearing***



***Centerless Grinder is built for productivity...***



The new Norton No. 2 Centerless Grinder can be arranged for full automatic, semi-automatic or manual thru-feed or plunge grinding. Capacity includes work diameters ranging from  $\frac{1}{16}$ " to  $4\frac{3}{4}$ " depending on type of work rest and bar grinding fixture.

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### 3 MAJOR ADVANCEMENTS IN CENTERLESS GRINDING

*accuracy...economy*

Like all Norton grinders and lappers the Norton No. 2 *Straddle-Bearing* Centerless Grinder is built to deliver "Touch of Gold" performance — the Norton extra that adds value to your product while cutting your production costs.

You'll find plenty of proof of that in the modern construction of this newest machine of its type. *Straddle* support of spindle bearings adds strength and ability to take tough jobs . . . the mobile wheel head and constant work-loading alignment make jobs shorter and easier.

Many other features result in outstanding performance advantages. Call your Norton Sales Engineer, a trained expert in the grinding field, for consultation on how these features can benefit your production. Or write for Catalog 1328. NORTON COMPANY, Machine Division, Worcester 6, Mass.

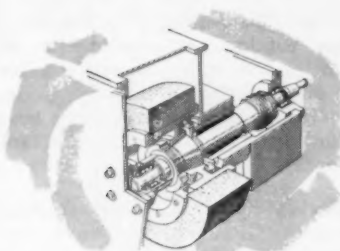
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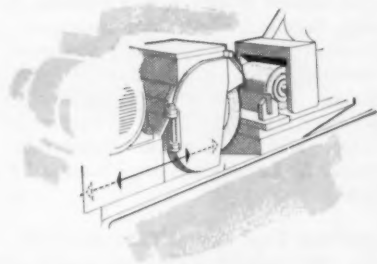
J. H. Ryder Machinery Co. Ltd., Toronto 18

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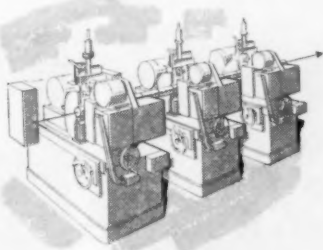
December, 1961



**Straddle-Bearing Spindle Support**, in both grinding and regulating wheels, provides extra strength. Combined with the inherent rigidity of Norton spindles this boosts capacity to take heaviest cutting pressures, while permitting fast grinding to close tolerances under all conditions.



**Mobile Grinding Wheel Head**, with wheel mounted between head ways and feed screw located beneath wheel center for ideal balance, provides instant response to signals. This results in especially fast sizing, one of many important advantages over fixed head operation.



**Work Loading Alignment** is never disturbed by wear of either grinding or regulating wheel . . . neither is the alignment of the work rest blade. Movable heads for both grinding and regulating wheels make this advantage possible . . . and especially time-saving in a battery set-up.

## CATALOGS . . . continued

**15. Cutter Sharpening Attachments.** A 24-page catalog on attachments and accessories for cutter sharpening features an improved cutter grinding fixture and air-cushioned spindle bearing. Rocheleau Tool and Die Co., Inc., Leominster, Mass.

**16. Boring Bars.** Catalog discusses micro-adjustable boring bars with throwaway inserts. Light, medium, or heavy cuts are possible with these bars because of chip control provided by the built-in, adjustable chip breaker. Vascoloy-Ramet Corp., Waukegan, Ill.

**17. Specialized Production Facilities.** A 12-page brochure describing specialized production facilities of Danly. Included are welding, machining, assembly, engineering, and other facilities which have been utilized by government agencies. Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Illinois.

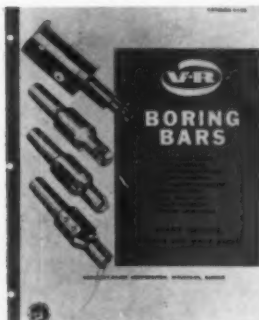
**18. Machine Tool Rental Plan.** Brochure covers the machine tool rental plan set up by DoALL which provides immediate installation of cost-cutting equipment designed to increase your productivity. The DoALL Co., Des Plaines, Ill.

**19. Milling Machine.** A 20-page bulletin on the B & S Rangemaster sliding-head type milling machine that is available as either a plain or universal type machine with 3-hp. spindle drive motors. Brown & Sharpe Mfg. Co., Machine Tool Division, Providence 1, Rhode Island.

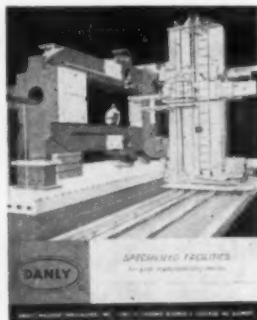
**20. Ball-Joint Countersink.** Bulletin covers a ball-joint countersink with radial float motion for precise depth and concentric countersinking, especially engineered for hand drills. Wohl-nip Products, Inc., 634 Central Ave., East Orange, N.J.

**21. Soluble Cutting Oils.** A technical bulletin on Shell Dromus and cool oils, which are soluble cutting oils formulated for improved performance and higher production in metalworking operations. Shell Oil Co., 50 W. 50th St., New York 20, N.Y.

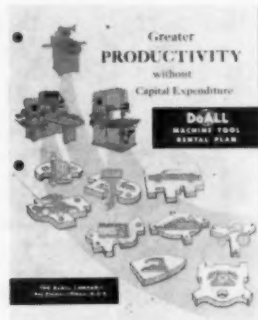
**22. Transfer Units.** Brochure describes the Livernois line of mechanical or cylinder actuated in-line transfer equipment for moving any part in any direction. Livernois Engineering Co., 25200 Trowbridge, Dearborn, Mich.



See Number 16



See Number 17



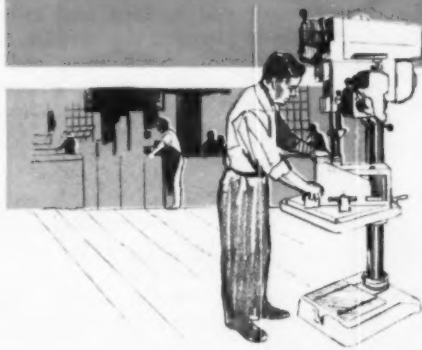
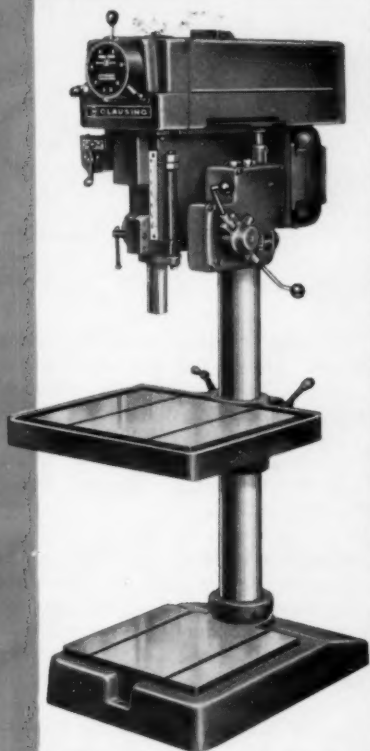
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# DIAL SPEEDS FROM 150 TO 2000 RPM

Positive variable countershaft drive powered by two-speed motor lets you dial the correct speed—from 150 to 2000 rpm.

Here are other exclusive features of the new Clausing 20-inch: *Production-rated capacity*  $\frac{1}{8}$ " in steel,  $1\frac{1}{2}$ " in cast iron; Gear driven power feed—no belts to shift on feeds or speeds!

The Clausing outperforms any other drill of comparable size—on every application. It's the outstanding drill press value. Make your Clausing dealer prove these claims! And write for literature on this and other Clausing 20" and 15" drills.



370

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See Number 26

**23. Physical Testing and Balancing Machines.** An 8-page brochure giving the latest developments in physical testing and balancing machines, including details on the 1,200,000 lb. Super "L" universal model. Tinius Olsen Testing Machine Co., Easton Road, Willow Grove, Pa.

**24. Resistance Welding Controls.** A 12-page bulletin on a line of resistance welding controls for spot, flash, projection, butt, and seam welding applications. General Electric Co., Schenectady 5, New York.

**25. How To Analyze Machinery Investment.** A 14-page manufacturing engineering brochure explains how to analyze machinery investment, tells how to decide when and what to automate. Case histories are given. Designers for Industry, Inc., 4241 Fulton Parkway, Cleveland 9, Ohio.

**26. Educational Wall Charts.** Twelve popular power tools are described on educational wall charts, designed as industrial education teaching aids. Covered are the most popular wood and metal-working power tools. Rockwell Mfg. Co., Power Tool Division, 400 N. Lexington Ave., Pittsburgh 8, Pa.

**27. Grinding Machines.** A brochure covering the line of Gardner grinding machines, including abrasive discs. Special-purpose machines included. Gardner Machine Co., Beloit, Wis.

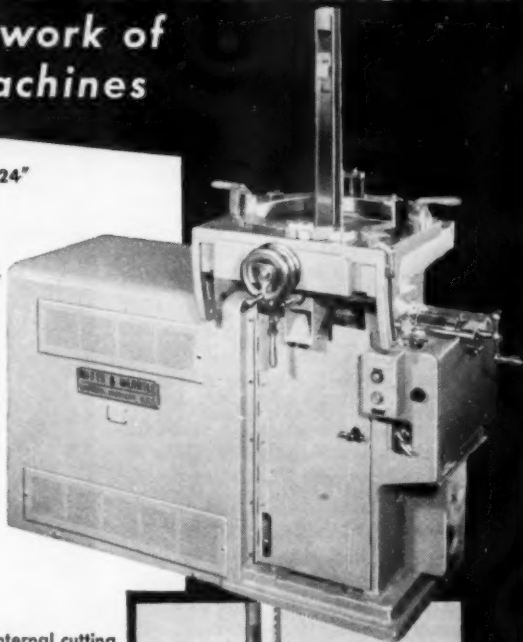
**28. Solid Carbide Tools.** Brochure giving application information and prices on small, very small, and miniature precision ground solid carbide tools. These tools are recommended for electronics circuit board and instrumentation applications. The Atrax Co., Day St., Newington 11, Conn.

**29. Driving Centers.** Catalog on driving centers which grip the end face of the work, allows you to load and unload work without stopping the spindle, and permits machining work from end to end. Backlash is reduced and slippage is eliminated. Power Grip, Inc., Rockfall, Conn.

**30. Micro-Turn Lathe.** Bulletin on an improved Nebel micro-turn high-speed precision lathe, describing the micro-turn's exclusive mechanical speed variator and coaxial spindle design. Nebel Machine Tool Corp., Dept. 32, 103 S. Cooper Ave., Cincinnati 15, Ohio.

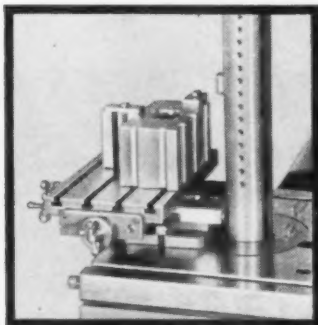
**AMAZING NEW** **M&M** **KEYSEATER**  
**HYDRAULIC** **AND VERTICAL CUTTING MACHINE**  
*does the work of*  
*many machines*

In addition to a keyseater that cuts internal keyways up to 3" wide x 24" long, the new hydraulic M & M is a handy tool room machine and can be easily adapted to special production jobs other than keyways. A wide variety of internal or external cuts, serrations, grooves and teeth can be rapidly made on this machine. With a combination tilting table and index table (shown on machine at right) straight or tapered bores and accurately spaced multiple keyways or splines may be cut at any degree of the circle. Send us prints of your cutting problems.

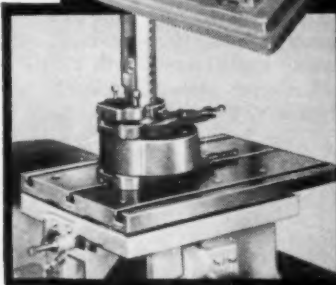


Right: Set-up for internal cutting

Below: Set-up for external cutting



106



BUILDERS OF MACHINERY  
SINCE 1854

**M&M** **KEYSEATERS AND**  
**VERTICAL CUTTING MACHINES**

**MITTS & MERRILL • 1015 S. WATER ST. • SAGINAW, MICHIGAN**

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## CATALOGS . . . continued

**31. Universal and Independent Chucks.** Brochure on two chucks which come in all standard mountings ready to go right to work without further adaptation. Kalamazoo Industries, Inc., P.O. Box 2558, Kalamazoo, Mich.

**32. Radial Drills.** A catalog sheet on high-precision radial drills that include two motors, two motor overload controls, preselective drive, coolant system, work table, and table light. Boice-Crane Co., 936 W. Central Ave., Toledo 6, Ohio.

**33. Abrasive Discs, Wheels, and Blades.** Brochure on the Keystone Abrasive line of discs, wheels, and blades. All discs are of triple reinforced resinoid. Keystone Abrasive Supply Co., 3461 E. 26th St., Los Angeles 23, Calif.

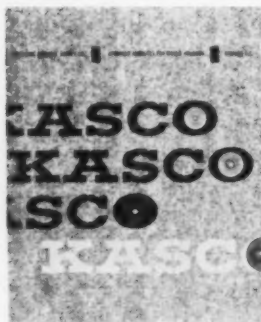
**34. Sintered Carbide Products and Die Machinery.** Catalog on the product lines of Firth Sterling including wire puller jaws and inserts, bar and tube drawing dies, mandrel nibs, barbing laps, and die finishing machinery. Firth Sterling Inc., 3113 Forbes Ave., Pittsburgh 30, Pennsylvania.

**35. Mechanical and Electrical Instrument Counters.** Catalog on the Durant line of mechanical and electrical instrument counters which can be used as a ready reference to determine the counting instruments best suited to particular applications. Durant Mfg. Co., 1928 N. Buffum St., Milwaukee 1, Wisconsin.

**36. Box-Type Furnaces.** Bulletin describes both bench and floor models of a box-type furnace which features a high temperature electronic proportioning control system. Blue M Electric Co., 138th & Chatham St., Blue Island, Ill.

**37. Prefabricated Conveyor Sections.** Bulletin on customized conveyors from prefabricated conveyor sections which makes it possible for users to create their own design for specific job applications. May-Fran Mfg. Co., 1710 Clarkston Rd., Cleveland 12, Ohio.

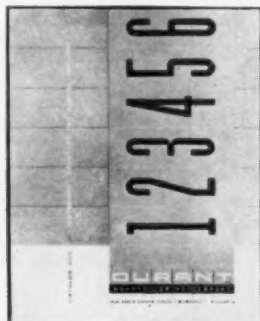
**38. Vitrified Bonded Grinding Wheels.** Bulletin describing the Simonds Abrasive Co.'s RA Borolon V8 vitrified bonded grinding wheels containing



See Number 33



See Number 34



See Number 35





*Problem:*

**One Straight Cut...**

**One Miter Cut**

*Solution:*

**One MARVEL No. 8  
Band Saw**

Recently, a MARVEL Field Engineer was called on to help solve a troublesome production sawing operation.

He found that a straight cut and a 45° miter cut were required on a 10" diameter pipe prior to welding it into an assembly. Production was slow, cutting costs were climbing to alarming proportions, and too many pieces were being rejected because one or both cuts were not meeting accuracy standards.

The trouble was easy to find. A makeshift arrangement was being used to do the job. After the straight cut was made, the miter was laid out and the pipe swung out into the aisle so that the saw could make the angle cut. Excessive work handling slowed production, valuable floor space was taken up, and accuracy became increasingly difficult to maintain.

Recommending a MARVEL No. 8 Universal Band Saw solved the problem. When the MARVEL Field Engineer showed how the Saw's column and blade can be tilted up to 45° right or left of vertical and fed straight into and through the cut at the pre-determined angle while the work remained stationary on the table, the production superintendent recognized the answer to his problem. He also saw, how the built-in protractor would eliminate all layout.

Result: another MARVEL No. 8 Universal Band Saw went to work for a new user.

Cutting miters quickly and accurately is just one of a hundred jobs that can be done on the versatile No. 8 Universal Band Saw... the most useful—and used—metal cutting saw on the market. Get complete information on this time and cost saving band saw today. Write for Catalog 875.

**Marvel No. 8 Universal  
Metal Cutting Band Saw**  
Capacity: 18" x 18"

**MARVEL** *Metal Cutting* **SAWS**

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

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**BETTER MACHINES  
BETTER BLADES**



See Number 39



See Number 40



See Number 41

man-made rubies. These wheels are designed for grinding operations on the toughest alloy steels, including space age metals. Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pennsylvania.

**39. Sheet Steel Separator.** Brochure on 29 standard models of magnetic sheet steel separators that provide efficient handling and separating of oily or slippery steel sheets or blanks of every gage, sheet size, and stock pile height for either automated or hand production. Magni-Power Co., Box 122, Wooster, Ohio.

**40. Air Cylinders.** A 16-page manual describing the operation and application of air cylinders. Engineering drawings and specifications included. Rivett Lathe & Grinder, Inc., Brighton 35, Massachusetts.

**41. Multiple Spindle Drill Heads.** Brochure on heads for drilling, reaming, tapping and boring with information on heads used in automation. Zagar, Inc., 24000 Lakeland Blvd., Cleveland 23, O.

**42. Shear Selection.** Packet consisting of a 4-page bulletin and a slide calculator for understanding and simplifying details and design of hydraulic shears. Calculator used to determine tonnage required to shear all commonly used metals. Verson Allsteel Press Co., 9300 S. Kenwood Ave., Chicago 19, Ill.

**43. Tool Digest.** A 4-page digest covering a complete line of tools designed especially for boring, recessing, and threading. Included are HHS, carbide-tipped, and solid tungsten carbide tools. Bokum Tool Co., Inc., 14775 Wildemere Ave., Detroit 38, Mich.

**44. Drill Jig Bushings.** A conversion chart designed to expedite the order-





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BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF CAST BRONZE, SINTERED METALS, ALUMINUM ALLOYS AND NYLON

Avoid inventory investment, delays, confusions, production problems by the immediate availability in small or large lots, from local distributors, of stock sizes of completely finished cast bronze and sintered bronze bearings and bars, aluminum bars and Nylon shapes. Special design bearings not obtainable from stock can be procured immediately at low cost from Bunting fully equipped machine shops in five industrial centers.

A large staff of bearing engineers in the field stands ready to assist in the use of these Bunting stock products and in the designing of bearings and components for extraordinary applications.

See Bunting's complete catalog, Sweets Product Design File 11C/BU or ask for Bunting's General Catalog, Form 61; Nylon Catalog, Form 32; Technical Handbook on Bunting Nylon, Form 33; The Technology of Bunting Aluminum, Form 46; Engineering Handbook of Powder Metallurgy, Form 1; Bunting Machine Shop Service, Form 4.



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TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

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## CATALOGS . . . continued

ing of drill jig bushings. Also included are A.S.A. standard symbol numbers. Acme Industrial Co., 200 N. Laflin, Chicago, Ill.

**45. Bronze Case.** Bulletin on bronze case rods in combination with hardened steel bushings for piston and guide rods and similar linear applications. Thomson Industries, Inc., Manhasset, N.Y.

**46. Hydraulic Filters.** A 4-page bulletin on a line of filters for suction line use in hydraulic systems. Filter elements are available in degrees of filtration from 74 to 238 microns and for flow rates to 120 gpm. Vickers Inc., Division of Sperry Rand Corp., Detroit 32, Mich.

**47. Routers and Drills.** Bulletin on carbide routers and circuit board drills including characteristics, performance, sizes, and prices of the carbide diamond-grind routers in addition to the solid carbide drills with the new circuit board point. M. A. Ford Mfg. Co., 1545 Rockingham Road, Davenport, Iowa.

**48. Electro-Hydraulic Tracer Mills.** A 6-page catalog giving an insight into the many job functions performed on

electro-hydraulic tracer mills. The system and operations are graphically illustrated. Famco Machine Co., Kenosha, Wisconsin.

**49. Pedestal and Bench Grinders.** Bulletin on two models of pedestal and bench grinders. Shafts are mounted in oversized sealed ball bearings for smoothest running. Wheel guards and spark shields are standard equipment. Powermatic Machine Co., McMinnville, Tennessee.

**50. Solid Lubrication.** Brochure discusses the theory and use of solid lubricants in galling and seizing, extreme pressures, high friction, chemical reaction, temperature, and extreme environments. The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

**51. Hydraulic Copying Unit for Lathes.** Circular describes a hydraulic copying unit for both longitudinal and lateral copying on lathes. Capacities and specifications included. Cazeneuve Lathes, Inc., 575 E. Linden Ave., Linden, N.J.

**52. Cams and Camshafts.** Bulletin on a wide range of cams and camshafts,



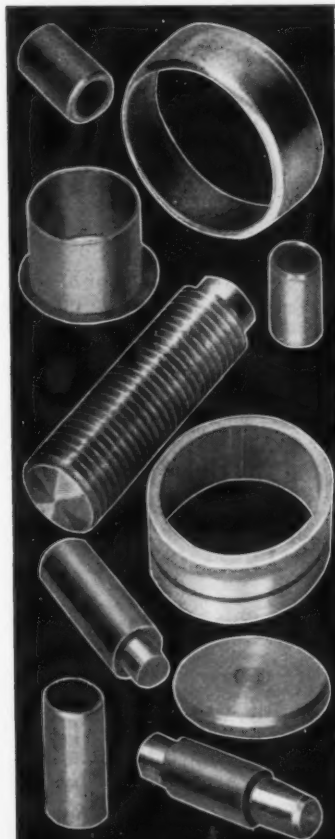
See Number 46



See Number 47



See Number 48



## TO CUT OFF AND FORM TUBING AND BAR STOCK IN A SINGLE OPERATION

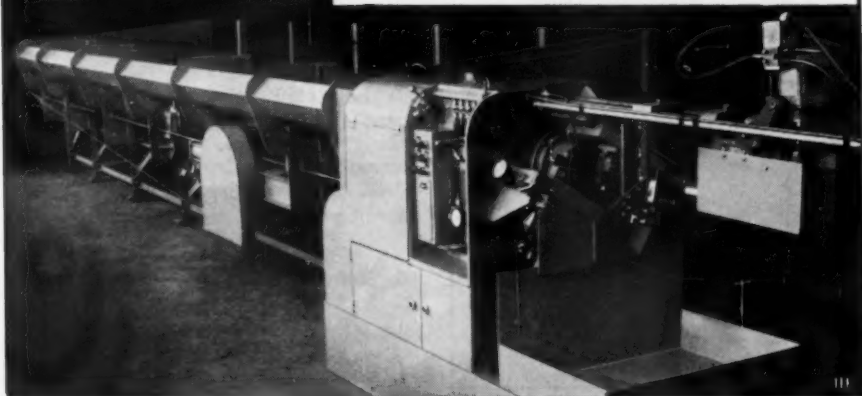
Here is a combination that feeds tubing and bar stock — automatically — to a fast, automatic cutting-off machine. Best of all, the pieces being cut off can be formed, grooved, flanged or chamfered at the same time.

There are models that handle tubing, pipe and bar stock from  $\frac{1}{8}$ " diameter up to solid bar stock of 3" OD and tubing up to 8" OD.

Why not investigate?

WRITE FOR CATALOG

**MODERN MACHINE TOOL CO.**  
2005 Losey St. • Jackson, Michigan



## CATALOGS . . . continued

including face and cylindrical cams, two and three dimensional cams, air-craft models, masters, hydraulic pump cams, and cams for wrapping and packaging special machinery. Eonic Inc., 464 E. Hollywood, Detroit 3, Mich.

**53. Brazing Alloy Reference Chart.** This chart lists metal compositions, densities, and metal and flow temperatures for Silvaloy silver brazing alloys and Engaloy precious metal brazing alloys. American Platinum and Silver Division of Engelhard Industries, Inc., Newark, New Jersey.

**54. Electromechanical Lead-Screw Unit.** Data sheet describing an electromechanical lead-screw unit that feeds to a positive stop. It is used for drilling, boring, reaming, counterboring, spot-facing, chamfering, and milling. The Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8, Ohio.



**55. Reamer and Drill Blanks.** A 4-page catalog on the Ace Drill line of high-speed steel reamer and drill blanks, including full specifications on individual blanks and blank sets. Ace Drill Corp., Adrian, Mich.

**56. Hydraulic Tracer.** A technical data sheet telling how a standard lathe can be converted quickly into a highly versatile, hydraulic tracer-controlled machine. Detroit Broach & Machine Co., Rochester, Mich.

**57. Screw-On and Clamp-On Cartridges.** A brochure which reflects the latest additions and modification of DeVlieg's standard lines of screw-on and clamp-on cartridges employed with throwaway precision carbide cutting tool inserts. Microbore Division, DeVlieg Machine Co., Royal Oak, Mich.

**58. Ball Radial Bearings.** A bulletin giving the specifications on Reali-Slim "CP" ball radial bearings which comes in 90 sizes of extremely thin section and are available for off-the-shelf delivery. The Kaydon Engineering Corp., Muskegon, Mich.

**59. Chain Lubrication.** A manual to be used as an essential reference for all chain lubrication problems. Recommendations and suggestions for lubricating power drive chains, as well as conveyor and elevator chains, are given. Oil-Rite Corp., 2374 Waldo Blvd., Manitowoc, Wis.

**60. Rotary and Indexing Tables and Angle Vises.** Catalog on the Palmgren line of rotary and indexing tables and angle vises. Palmgren Products, 8392 S. Chicago Ave., Chicago 17, Ill.



REDUCE MANUAL HANDLING OF PARTS TO A MINIMUM

**SYNTRON**

**Transfer & Storage**

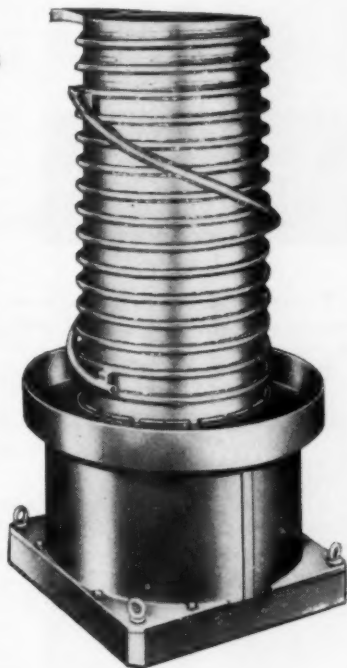
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**Relieve production lag between primary and secondary operations**

Syntron Transfer & Storage Parts Feeders are designed to receive parts at one level, store prior to usage and discharge in an oriented position at another level. They provide an automatic, instantly adjustable method of distributing parts from one process operation to another; eliminating slow, manual parts handling.

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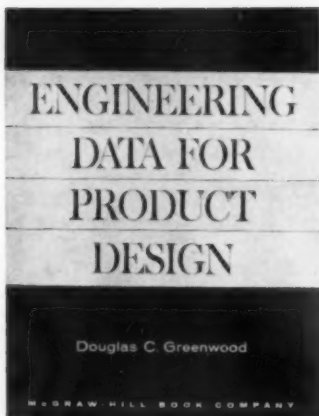
**SYNTRON**

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# BB

## Book Reviews



### Engineering Data For Product Design

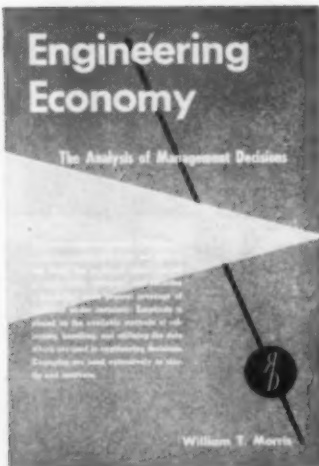
(By Douglas C. Greenwood, 430 pages, \$10.00)

You can save valuable time and eliminate needless work in solving product design problems with the help provided in this handy manual. It places at your fingertips a wealth of engineering data, such as charts, formulae, tables, and vital facts.

All material has been chosen by an experienced design engineer on the basis of direct interest and usefulness to the product engineer. This information can be quickly and easily adapted to your own needs as they relate to such areas as metals and alloys, nonmetallic materials and finishes, and design analysis. Here, too, are clear cut answers to questions you may have involving beams, torque, and moment of inertia, bearings and shafts, springs and vibration, and mechanical control.

This manual brings you abreast of modern aspects, including dielectric heating, nameplates, metal whiskers, radiation characteristics of metals, and applications of radioisotopes.

**The Book Shelf**, Hitchcock Publishing Co., Wheaton, Illinois.

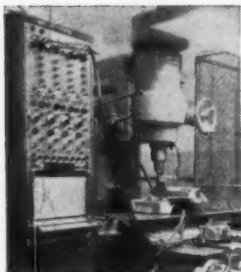


### Engineering Economy

(By William T. Morris, 506 pages, \$10.65)

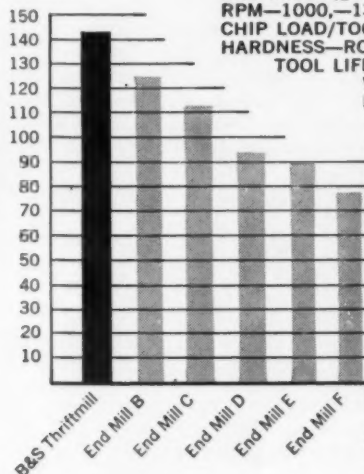
Within the general context of the analysis of engineering decisions, this volume sets forth the principal ideas treated in engineering economy, and includes a somewhat more general coverage of decisions under certainty. Emphasis is placed on the available methods of collecting, handling and utilizing the data which are used in engineering decisions. Examples are used extensively to clarify and motivate.

The book is designed so that it can be used in a variety of ways. The first twenty-six chapters are designed primarily for the reader who is just beginning to comprehend engineering economy. Basic fundamentals are herewith given. The final seven chapters are written so that they can be used independently as self-contained presentations.



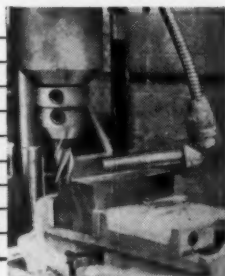
**8 CHANNEL  
RECORDER,  
DYNAMOMETER  
AND MILL.**

TOOL LIFE  
IN INCHES



**MATERIAL—VASCO JET 1000  
END MILL—½" DIA.—4 FLUTE  
RPM—1000,—130 SFM  
CHIP LOAD/TOOTH—.0019"  
HARDNESS—RC24**

**TOOL LIFE—DESTRUCTION  
WIDTH OF CUT—1.000"  
DEPTH OF CUT—.100"**



**MILLING TEST SET-UP  
SHOWING VASCO JET  
1000 WORKPIECE**

## **B&S Thriftmill® wins tooling torture test at North American Aviation!**

It is interesting to note that the best tool life of 142" at 130 SFM produced complete break down destruction of cutter, but in later tests, on the same hardness of material, 2016" of tool life with only a .010" wear land was acquired at a more normal speed of 43 SFM.

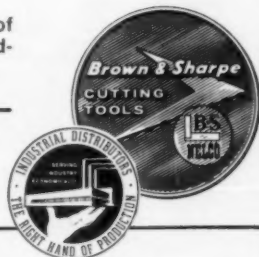
This (Thriftmill) cutter is unique from others in this series of tests for the reasons that it is cheaper to purchase than standard cutters and its geometry is quite different.

Of course, this is what B&S has been saying all along—**THRIFTMILLS ARE DIFFERENT.**

*For that EXTRA Edge in Production!*

# **Brown & Sharpe**

Cutting Tool Division  
Brown & Sharpe Mfg. Co.  
Providence 1, Rhode Island



It is presumed that the reader has some acquaintance with economics, accounting, and probability theory. However, the realities of memory have prompted the inclusion of sections on these topics at appropriate points in the book. These sections are intended only for review and reorganization of

ideas and are not designed as introductory presentations.

Four appendixes provide parallel information on interest calculations, reproof of the law of long-run success, and interest tables.

**The Book Shelf**, Hitchcock Publishing Co., Wheaton, Illinois.

### **Handbook For Technical Writers**

(By R. C. Tracy and H. L. Jennings, 134 pages, \$3.50)

Technical writing has become evermore important in this age of rapidly advancing science and technology. The communication of technical individuals must be used to benefit others. Thus, technical writing has become a vital link between the scientists and the engineers.

Primary organizations that generate technical documents are government contractors and agencies. Therefore, subject matter in this book is geared toward these two groups. Special attention is given to the preparation of reports, with additional information on government prepared documents.

The authors of this handbook have prepared this publication for use both in the classroom and industry. The student can obtain a knowledge of the responsibilities of a technical writer and the writer can use this handbook as a ready reference in preparing documents required by his employer. Also, this book is designed to aid corporate management in the organization of technical writing and publishing functions within a personnel structure.

The handbook is separated in five chapters: the function of technical writing; elements of documents; style; writing mechanics; and security requirements. Figures of examples and cases are sufficiently self-explanatory and are designed to aid readers in particular situations.

An added section on abbreviations commonly used by technical writers rounds out this handbook.

**The Book Shelf**, Hitchcock Publishing Co., Wheaton, Ill.

### **Film On "Better Grinding"**

A 26 minute, sound, color filmstrip, "Better Grinding" is available from the Landis Tool Co., Waynesboro, Pa.

Done in a cartoon style, "Better Grinding" describes and illustrates the "how to do it" for operators of cylindrical grinders. It should also be of interest to foremen of grinding departments, methods people, process engineers, training groups and personnel concerned with the "dos" and "don'ts" of cylindrical grinding.

Audio-Visual Department, Landis Tool Co., Waynesboro, Pa.



**the chuck  
that came back  
...20 YEARS  
LATER!**



This chuck was returned for refurbishing after 20 years of service!

Actually, this is not an out-of-the-ordinary service record for Logan chucks, because they are built throughout with extra factors of strength and durability to resist deflection, misalignment and wear—and to deliver accurate, dependable and efficient service year after year on any type of operation.

If you would like more information about these rugged, long-lasting air and hydraulic chucks, or any of Logan's other products, just fill out the coupon below.

*\*Customer's name furnished upon request.*

**LOGAN**  
AIR AND HYDRAULIC OPERATED MACHINES

**Check the items you want, fill in your name and address, tear out and mail to:**

**Logansport Machine Co., Inc. • 750 Center Avenue, Logansport, Indiana**

- ☐ 100-1 AIR CYLINDERS
- ☐ 100-2 MILL-TYPE AIR CYLS.
- ☐ 100-3 AIR-DRAULIC CYLS.
- ☐ 100-4 AIR VALVES
- ☐ 100-5 LOGANSQUARE CYLS.
- ☐ 100-6 ULTRAMATION CYLS.
- ☐ 100-7 SUB-PLATE AIR VALVE
- ☐ 300-1 CHUCKS
- ☐ 300-2 PRESSES

- ☐ 200-1 HYD. POWER UNITS
- ☐ 200-2 ROTOCASE HYD. CYLS.
- ☐ 200-3 750 SERIES HYD. CYLS.
- ☐ 200-4 and 200-7 HYD. VALVES
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- ☐ FACTS OF LIFE

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# NEW Walker-Turner Unidrill\*

GIVES YOU 5-WAY FLEXIBILITY



With the Unidrill you can position the cutting tool to the work in five different ways—move and tilt the drill head to speed the operation, reduce set-up time and eliminate expensive jigs. It's a 2-foot arm radial drill press designed to handle problem drilling jobs—angular drilling, heavy work, bulky pieces.

You can do reaming, spot facing, counter-boring and many other jobs. The Unidrill offers six interchangeable spindles or spindle adapters plus a 12-speed multi-speed attachment that provide even greater versatility.

Ask your Walker-Turner Distributor (listed under MACHINE TOOLS or TOOLS in the Yellow Pages) to show

you how the Unidrill can drill to the center of a 48" circle.

**FREE BROCHURE** shows the full Unidrill line. Write: Rockwell Manufacturing Company, Walker-Turner Division, Dept. WM-23, 400 N. Lexington Ave., Pittsburgh 8, Pa.

\*Trademark

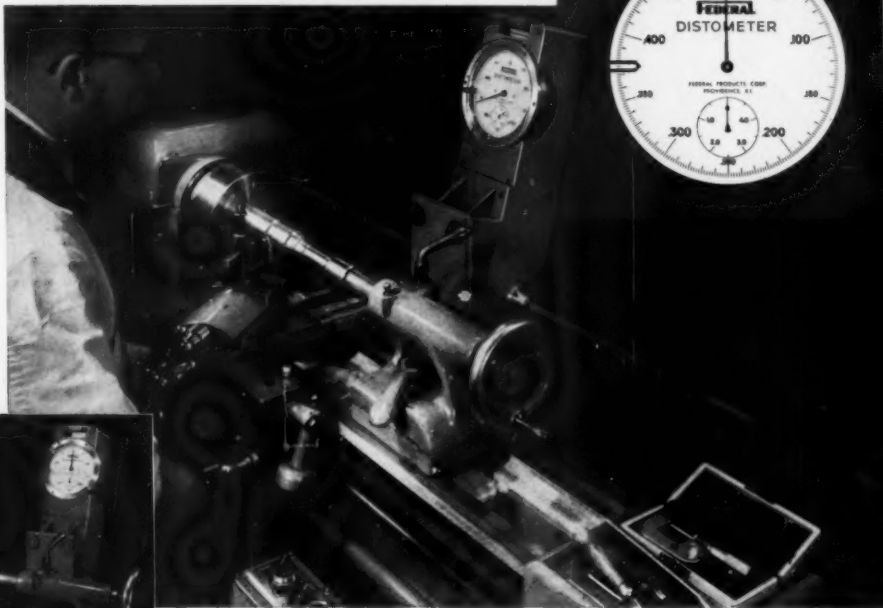


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# Right before your eyes...

## A 27% (or more) INCREASE in LATHE PRODUCTIVITY!



**The DISTOMETER**, a totally new precision instrument, greatly increases lathe output ...

Because —

- It provides a much faster, more convenient and more reliable means of spotting tool position and measuring longitudinal cutting distance than any other available device.
- It has motorized, Push-Button Zeroing. Lets you reference instantly at any point in the carriage travel for continuous measurement to any other point.
- It puts accurate, well magnified, man-size readings in front of the operator so he can follow progress of the tool and know instantly when it has covered the required distance.
- It requires no set up, no positioning, no mastering. Ready to measure directly at the touch of a button.

**ANY MANUALLY OPERATED LATHE . . . OLD OR NEW . . . BIG OR SMALL . . . CAN USE THE DISTOMETER PROFITABLY!**

*Write for brochure.*

**FEDERAL PRODUCTS CORP.**

**20012 Eddy Street, Providence 1, R. I.**

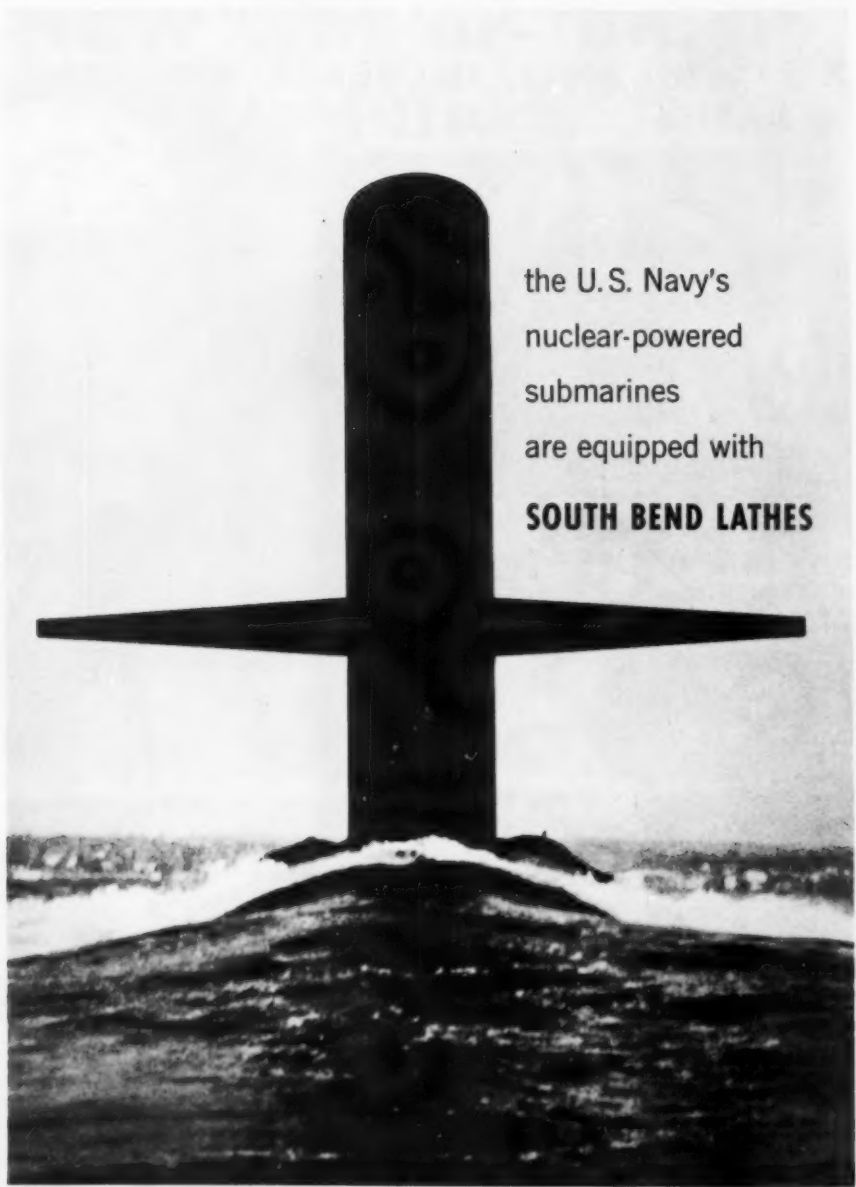
*Ask* **FEDERAL** *First*

**FOR RECOMMENDATIONS IN MODERN GAGES . . .**

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

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**Push-Button Zeroing . . .** you're instantly and automatically ready to measure off the next distance.



the U.S. Navy's  
nuclear-powered  
submarines  
are equipped with  
**SOUTH BEND LATHES**

Official U.S. Navy Photograph

*use Airpower—not Manpower\**

# CUSHMAN

**AIR OPERATED CHUCKS AND CYLINDERS**

\* Cushman Air  
Operated Chucks  
speed production  
and improve  
product quality,  
eliminate fatiguing  
hand wrenching,  
plus related  
rejects and  
accidents.

SOLD THROUGH  
INDUSTRIAL  
DISTRIBUTORS

*Cushman also manufactures manually operated chucks, power wrenches, and face plate jaws.*

**THE CUSHMAN CHUCK COMPANY • HARTFORD 2, CONNECTICUT**

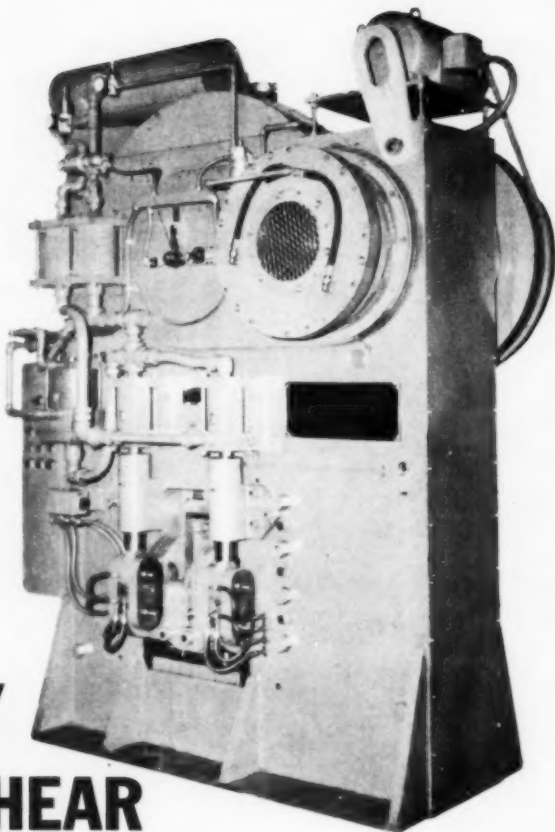


► **HIGH SHEARING SPEED**—Up to 18,000 cuts per 8 hour shift.

► **CLEAN, SQUARE CUTS**—Shows up hidden defects.

► **COMPACT DESIGN**—Saves floor space.

► **AUTOMATIC FEED TABLES**—Available to your requirements.



## 'BUFFALO' BILLET SHEAR

Now—enjoy peak production on your billet cutting jobs. This new 'Buffalo' Billet Shear is ruggedly-built for maximum years of dependable, trouble-free performance. Greatest output at lowest cost is assured by efficient high speed operation. Clean, square cut billets

permit high quality finished forgings. Features include alloy steel frame, electrical controls and pneumatic automatic oiling system.

For full details, including capacities available, contact your machine tool dealer or write us direct.



### MACHINE TOOL DIVISION **BUFFALO FORGE COMPANY**

Buffalo, New York  
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.



'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.



'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.



Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

Introducing

# DASCO 950

WATER-MIX CONCENTRATE

## CUTTING FLUID COSTS GO DOWNHILL!

*Reasoning is simple*—with STUART'S DASCO 950 and water, you can now replace many of the sulfurized or sulfochlorinated straight oil type cutting fluids you're now using to perform the tougher operations on materials in the medium to severe range of machinability: low carbon steels, alloy steels, stainless steels, and high temperature alloys.

To *replace these straight oils*, use DASCO 950 and water for: tapping and threading—spline and contour broaching—gear shaping and generating—gear hobbing, automatic bar and chucking machine work, or where high surface finish requirements prevail on drilling, milling, reaming,

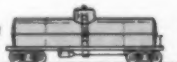
boring or lathe operations performed on soft, tough, stringy materials.

DASCO 950 provides effective anti-weld protection in the form of a very active type sulfur, as well as protection against excessive front clearance wear as a result of its two chemical lubricity additives.

Furthermore, you're insured against rough finishes due to chip welding or excessive built-up-edge. You gain proper chip formation, savings in tools through less frictional wear and cooler cutting.

If you're interested in *replacing straight oils*—reducing cutting fluid costs—improving job performance, contact us!

WHY BUY A TANK CAR  
OF CUTTING OIL...



THAT CAN BE REPLACED WITH  
A DRUM OF DASCO 950  
WATER-MIX CONCENTRATE...



PLUS WATER...  
SCOT FREE WATER

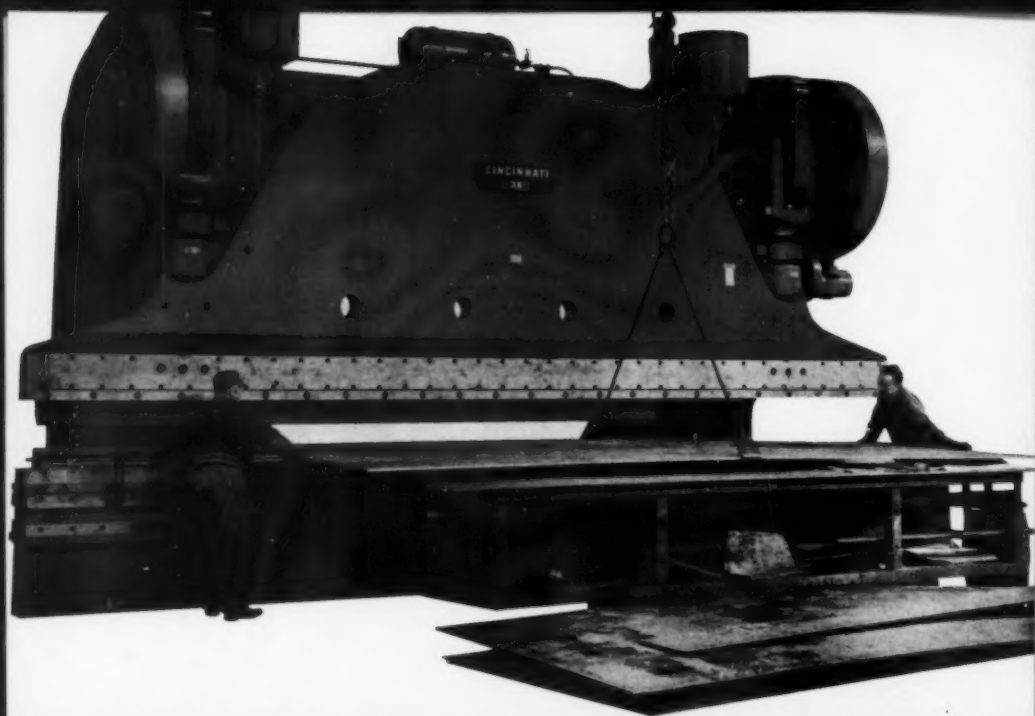


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**D. A. STUART OIL CO., LIMITED**  
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CINCINNATI® PRESS BRAKE

**gets new business**

Bigger jobs, fewer welded seams, less handling, and easier operation—McGregor-Michigan Corporation gets all four advantages from this 36 Series Cincinnati Press Brake.

As a result, "this new brake . . . helps us be more competitive with some of the larger shops," says R. Hilprecht, sales manager of this steel plate fabricating shop.

This is another example of the way Cincinnati Press Brakes and Cincinnati Shears are reducing costs and opening up new business for shops across the country. If you don't have the new catalogs on these machines, both mechanical and hydraulic, please write for them.

Shapers / Shears / Press Brakes

**THE CINCINNATI ·  
SHAPER co.**



Cincinnati 11, Ohio, U.S.A.

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**gives you better  
stainless products!**



## ALLEN Stainless Steel Cap and Set Screws

- NON-CORRODING
- HIGH TENSILE STRENGTH

- HEAT RESISTANT
- BRIGHT, LUSTROUS FINISH

Allen offers you 190 stock sizes in Stainless Steel Socket Head Cap Screws, now available as standard items in Type 18-8 Stainless or equivalent quality with '60 Series or '36 Series head diameters. Sizes range from No. 0 x  $\frac{1}{16}$ " to  $\frac{5}{8}$ " x 3", inclusive. Smooth heads supplied unless grip heads are specified.

Stainless Set Screws with deep-driving, tight-holding ALLENPOINT are available in 54 standard sizes from No. 0 x  $\frac{1}{16}$ " to  $\frac{1}{2}$ " x 1", inclusive.

When designs call for bright finish and ability to stand up to corrosion, you'll find Allen the answer in the largest range of sizes.

### \*PRODUCT QUALITY ASSURANCE



PQA, symbol of unquestioned quality at Allen, stands for *constant* quality control from upgrading of incoming raw materials to shipment of *unconditionally guaranteed* finished products.

PQA goes further. It brings you such helpful information as this STAINLESS STEEL DATA (G22) brochure, comparing stainless steel alloys according

to advantages, limitations and applications. It lists chemical composition and mechanical properties of 40 widely used stainless alloys; gives comparative corrosion resistance to various media, elevated temperature service data, and other characteristics of stainless steels.

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MANUFACTURING COMPANY  
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Take a  
**U. S. Universal  
Adjustable  
Drill Head**

... use slip spindles, and a jig-bored slip spindle plate for every production hole-pattern job.

... when needed, use a plain or indexing holding fixture and guide bushing plate;

... for short runs, locate standard adjustable arm brackets quickly with a bushing plate.

Do this with as many different size U.S. Drill Heads as needed for your multiple hole work. You now have possibilities unlimited for lowest cost per drilled hole! And, with a reversing spindle, you can *drill and tap with the same head!*

Call your U.S. Drill Head Representative, or contact us direct.

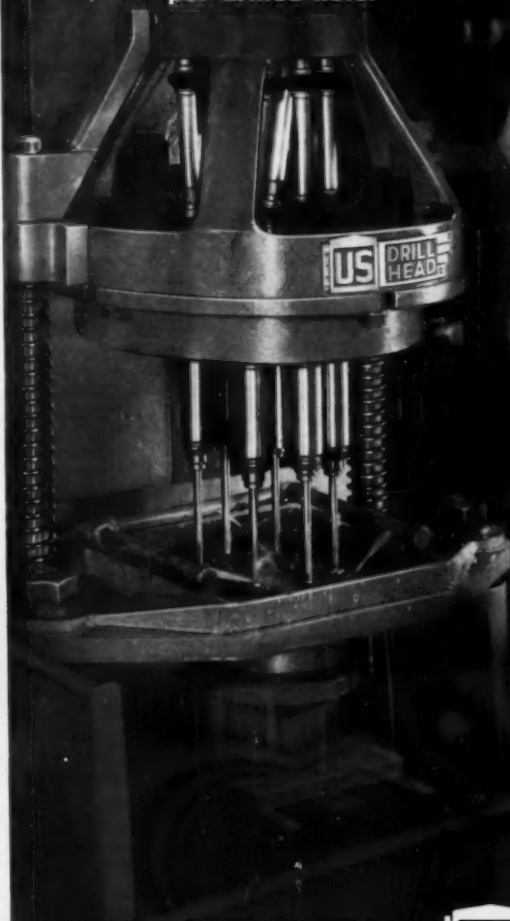


Style U-2 Head drilling housing flange. Inset shows "tool crib" of drills and slip spindle plates used with this head on 17 other setups.

U.S. Universal Heads are built in 8 models, 6 to 12 spindles, 6" to 15" drilling areas,  $\frac{1}{4}$ " to  $1\frac{1}{4}$ " capacities. Positive drive, hardened shaved gears, super finish spindles, heavy-duty lifetime-lubricated joints. Ask for catalog AD-57.

# possibilities unlimited

for lowest cost  
per drilled hole!



**UNITED STATES DRILL HEAD CO.**

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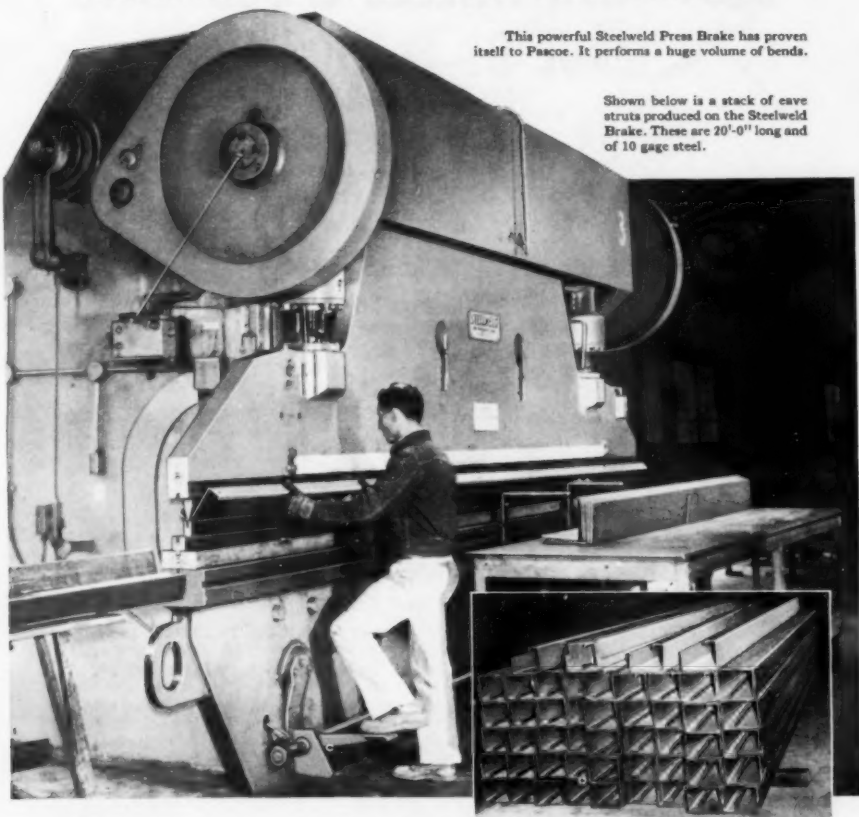
Adjustable and Fixed Center Multiple Drilling Heads —  
Individual Lead-Screw Multiple Tapping Heads — and Fixtures.

# STEELWELD BRAKE

## AIDS PASCOE BUILDING PRODUCTION

This powerful Steelweld Press Brake has proven itself to Pascoe. It performs a huge volume of bends.

Shown below is a stack of eave struts produced on the Steelweld Brake. These are 20'-0" long and of 10 gage steel.



**A**N important manufacturer of prefabricated steel buildings on the West Coast, the Pascoe Steel Corporation, Pomona, California, keeps their Steelweld Press Brake going full tilt in order to keep up with the production schedule.

The brake normally handles steel up to 20'-0" x  $\frac{3}{16}$ ", although occasionally  $\frac{1}{4}$ " metal is formed. It has the speed and power to produce sharp accurate bends at a fast rate.

Despite all the work put through, only the meagerest amount of maintenance is required. For instance, the clutch has had to be adjusted only once, every eight-month period and this

can be done in very few minutes.

Pascoe builds a complete line of pre-engineered buildings which are used for warehouses, light manufacturing, grain storage, auditoriums, aircraft hangers, etc.

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### STEELWELD

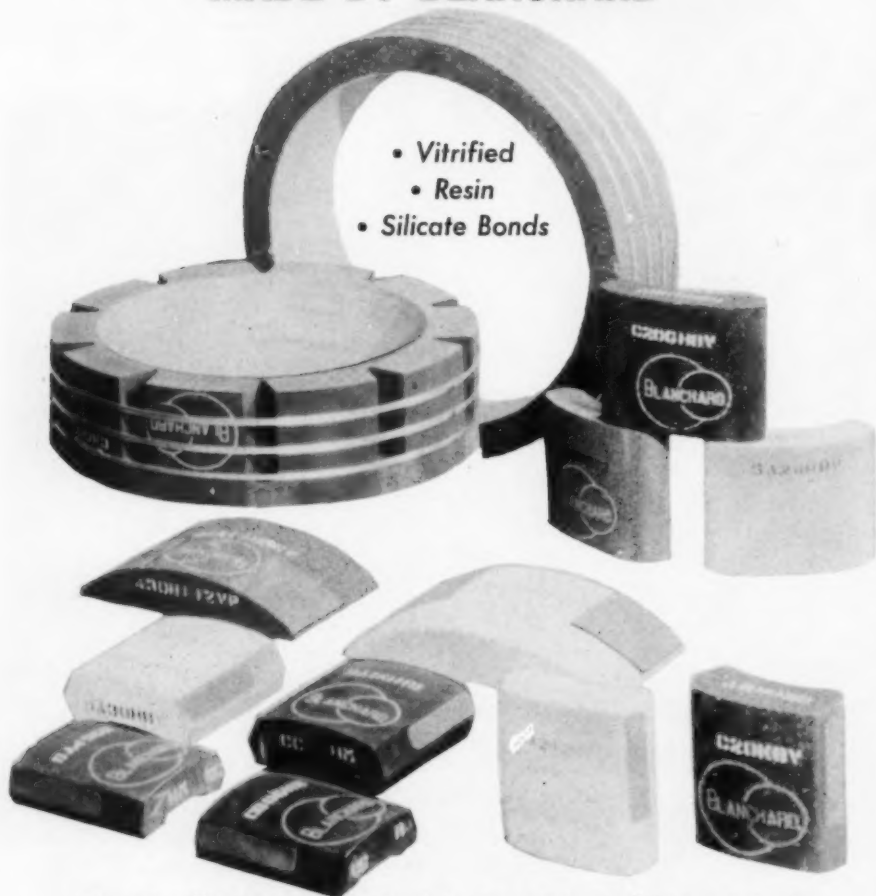
Mechanical and Hydraulic  
PRESS BRAKES



Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

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- Vitrified
- Resin
- Silicate Bonds

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**PUT IT ON THE**



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MACHINE and TOOL BLUE BOOK

**"NO OTHER HEAD OFFERS  
SUCH RANGE and VERSATILITY  
ON THE PRODUCTION LINE"**

## JARVIS UNIVERSAL JOINT MULTIPLE SPINDLE HEADS

\* For example, you can add to the basic head one or more of 20 optional accessories (such as Spindle Assemblies, Spindle Cluster Plate, Base Plate, Guide Rods, etc.) to meet the requirements of a particular job.

With Jarvis Heads you have a greater selection of parts and accessories. A buy-only-what-you-need, custom-built head without having to pay the high cost of regular custom designed heads.

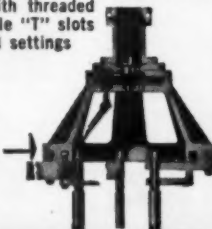
Universal joints are of an advanced structural design which feature: low deflection rate; superior fatigue resistance; greater overload capacity and longer life. Joints have a snap-on feature and can be slipped off the spindle without use of tools.



### EXCLUSIVE JARVIS FEATURES

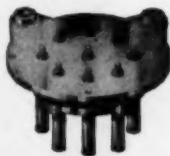
Cut-away view (below) reveals high strength, light weight aluminum alloy castings, heavily ribbed for durability; gears and spindle drivers run in ball bearings, have more than thrust load capacities; idler gears mounted on heavy duty needle bearings running on specially heat treated steel studs; adjustable outrigger arms locked in position with threaded studs located in double "T" slots for positive positional settings

**DOUBLE "T" SLOTS,  
NOT FOUND ON  
MOST OTHER HEADS,  
ADD RIGIDITY**



### NO NEED TO INVENTORY SEVERAL FIXED HEADS

Head converts easily to a fixed head by adding a Jarvis Spindle Cluster Plate (shown below) which can be jig bored, by you or by us, to locate spindles to suit hole spacing required. Cluster Plates will aid in reducing setup time and will assure correct setup each time.



### SEND TODAY FOR COMPLETE DETAILS

**JARVIS CORPORATION,**  
40 Pease Ave., Middletown, Connecticut  
Send U.J. Multiple Spindle Head Catalog

Name  Title

Company

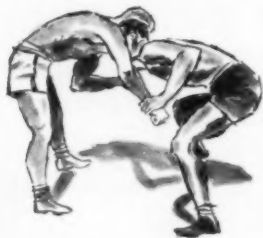
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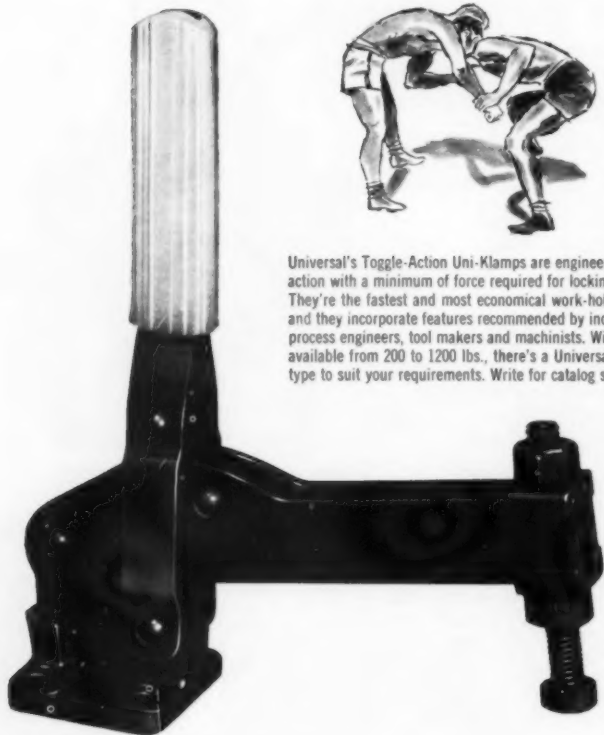
**Jarvis** CORPORATION

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Universal's Toggle-Action Uni-Klamps are engineered to give positive action with a minimum of force required for locking or unlocking. They're the fastest and most economical work-holding devices yet designed and they incorporate features recommended by independent tool designers, process engineers, tool makers and machinists. With clamp pressures available from 200 to 1200 lbs., there's a Universal Uni-Klamp in a size and type to suit your requirements. Write for catalog showing complete line.



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TYPE CLAMPS



PUSH-PULL  
CLAMPS



PORTABLE  
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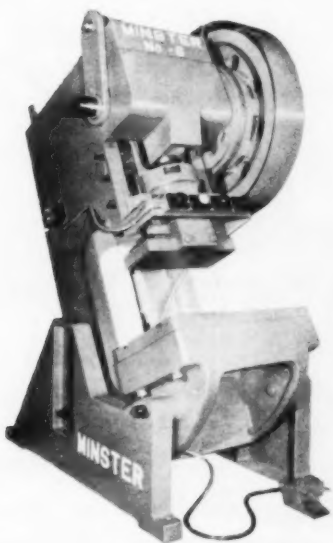
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CLAMPS

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at the "hidden strengths and values" found only in a Minster O.B.I. press. Quality is not always visible at first glance. The fine points of design and construction which mean the difference between good performance and superior performance can easily be overlooked.

When evaluating O.B.I. presses, carefully compare clutches, slide areas, recirculating lubrication systems, and inclining mechanisms. On any size—16 through 250 tons—a Minster O.B.I. offers you more value for your money. Ask a Minster representative to prove it.  
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Choose the model FELLOWS-PFAUTER Hobbing Machine that best meets your work capacity requirements. With either machine you'll be certain of getting cost-cutting, high production performance.

Both models set up fast and are easy to handle. Work areas are easily accessible. Automatic retraction of table from hob facilitates work changes. Advanced design provides pushbutton hob shifting, built-in hydraulics for operation of tailstock and fixtures, and infinitely variable speeds and feeds. Construction is solid and rugged throughout.

Improve your productivity and profits with a FELLOWS-PFAUTER High-Speed Hobbing Machine. Write for complete details today.



### NEW... Dictionary of Change-Gear Combinations

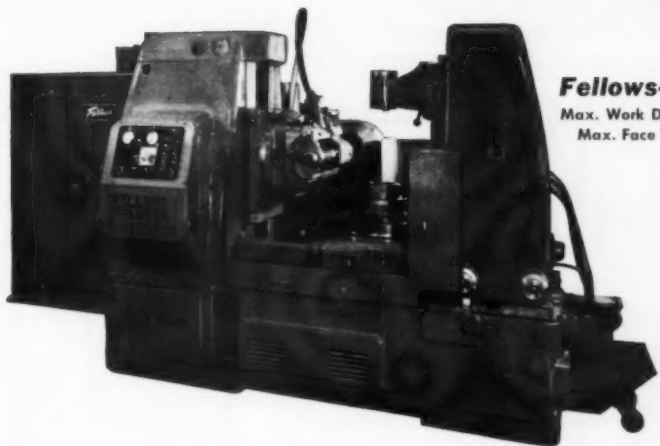
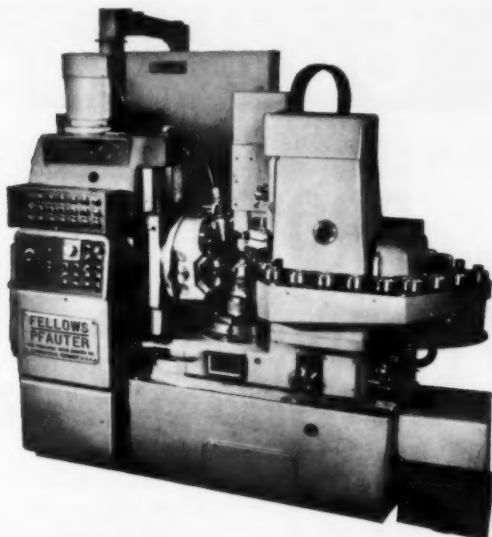
"Fellows-Pfauter Change Gear Tables" by F. Becher and A. Koerner eliminates tedious calculations and trial-and-error methods.

This English edition contains combinations for more than 26,000 ratios carried to six decimal places from .100,000 to 1,000,000, with the greatest step approximately .00005. Change gears in the range of 18 to 80 teeth are mainly used. Examples of applications are given. Only \$8.00.

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Max. Face Width — 11" at 16" dia.;  
Hob R.P.M. — 80-500.



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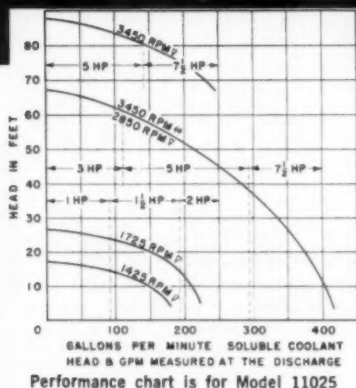
# *Fellows*

*Gear Production Equipment*

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## Coolant Pumps

are **PROVED IN**  
**PERFORMANCE**



You can be sure that your GUSHER Coolant Pumps will give you year after year of highly satisfactory service. GUSHER Pumps are built to last the life of the machine they service.



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Model 11024 CM Long for pump installations requiring standard NEMA foot mounted motors to meet J.I.C. specifications. Available in 1/4 HP and larger.



Gusher, fully portable, Tank Units are available in capacities from 10 to 50 gallons.

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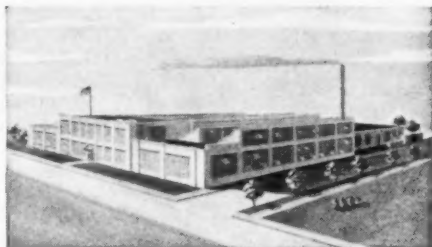
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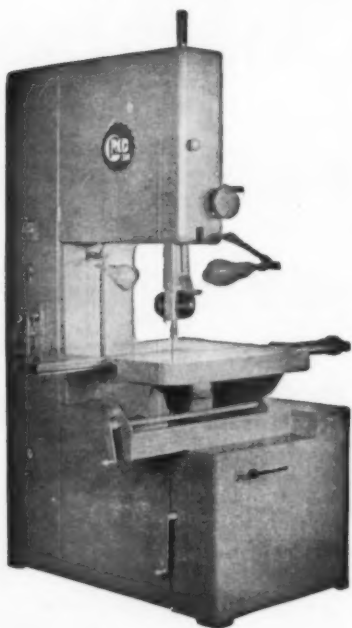


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**P. O. BOX 750 • COLUMBUS, OHIO**

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The new GROB 24" universal band saw  
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- Variable drive 3-speed transmission with precision rolled gears and splines transmits 15 HP

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MACHINE and TOOL BLUE BOOK



# CIMPERIAL SOLVES GRINDING ROOM PROBLEMS

for parts manufacturer. Another success story for versatile CIMPERIAL, heavy duty cutting fluid of famous CIMCOOL line.

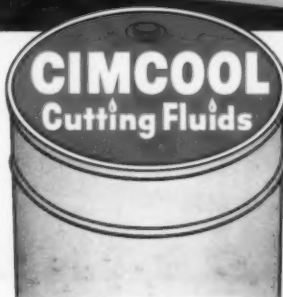
(Company name on request.)



## FIELD SERVICE REPORT

and in their grinding department they had all kinds of trouble with the coolant which fed to each machine from a 3,000 gallon central system. The coolant they were using got dirty and loaded up with grit. It didn't have enough lubricity to give them a good finish. Also, they experienced line clogging, rust and rancidity. We installed Cimperial at 100-to-1. Right away their finish cleared up. The coolant lines stayed open. No rust or rancidity at all. And with Cimperial they find they are getting 10 to 15% more pieces with each dressing of the wheel. They sure are happy with that boost in production on top of the other performance improvements.

*Bob Hancock*  
Cleveland Office



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Production-Proved products of The Cincinnati Milling Machine Co.

**FIVE-STAR CIMCOOL**—Newest in the industry-proven line of Cimcool® Cutting Fluids.

**CIMPERIAL®**—Heavy duty replacement for cutting oils in those low-speed tough jobs.

**CIMPLUS**—The transparent grinding fluid which provides exceptional rust control.

**CIMCUT Concentrates (AA, NC, SS)**—For every job requiring an oil-base cutting fluid.

**ALSO—CIMCOOL Tapping Compound—CIMCOOL Bactericide—CIMCOOL Machine Cleaner.**

For full information on the complete family of Cimcool Cutting Fluids, call your Cimcool Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

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Walker, for the first time in machine tool history, offers safe magnetic holding for lathes. Ceramic magnets in Walker Rotary CERAMAX chucks are not subject to electrical power failure and have three times greater coercive force than ordinary Alnico magnets. With uniform holding power over the entire face of the chuck, safe, accurate turning, facing or trepanning is accomplished in a single set-up.

*For dependable, trouble free operation specify Walker CERAMAX Chucks.*



## GRINDING

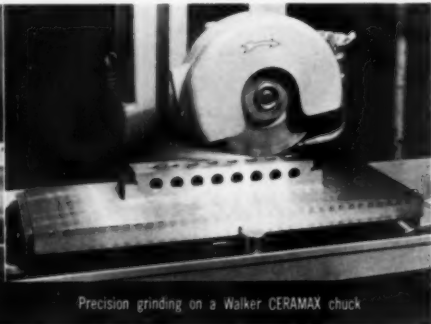
Walker CERAMAX chucks provide all the holding power needed for standard grinding operations and with fine pole divisions are ideal for thin, small work as well as large, heavy pieces. All-steel top plate minimizes redressing to reduce non-productive machine time. Ceramic magnets retain magnetism permanently, eliminate constant recharging.

***O.S. Walker*** Co., Inc.  
ROCKDALE ST. • WORCESTER 6, MASS.

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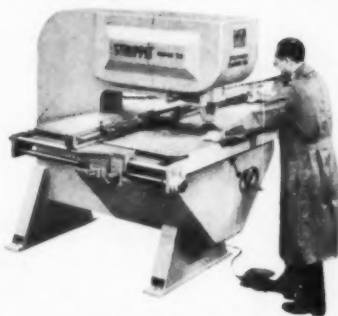
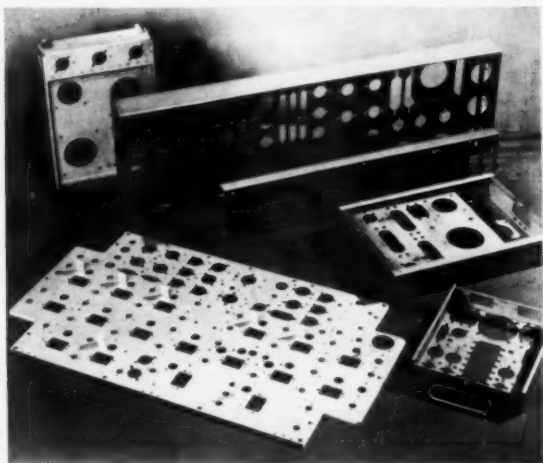
Turning a steel sleeve with a Walker Ceramax Chuck



Precision grinding on a Walker CERAMAX chuck

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**SUPER 30.** Handles flat or formed workpieces 60" wide...any length. Both the Super 30 and the 15A punch round and shaped holes up to 3½" diameter, to ¼" thick material...notch 90° corners—rectangular, radii, vee and special shape edge notches—up to ½" capacity...nibble straight line or contour shear up to 38" diameter circle, at 165 strokes a minute in ¼" material.

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*In Canada: Strippit Tool & Machine Company, Brampton, Ont.; In Continental Europe: Raschin, S. A., Lausanne, Switzerland; In the British Isles: Kearney & Treacher—C. V. A. Ltd., Hove, Sussex, England*



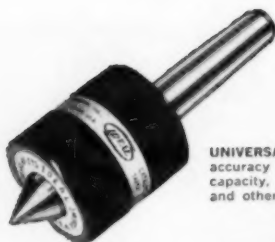
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*meet most turning needs  
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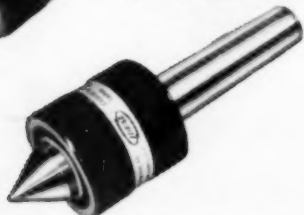
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Ideal Live Centers are guaranteed to  
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What's more, they are custom quality  
designed and manufactured by production  
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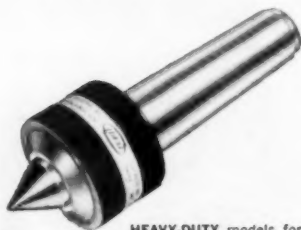
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Designed for heavy duty high speed production cutting with high speed or carbon steel blades.

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- NEW!** Dozens more exclusive and patented features!

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Capacity	14 x 18	24 x 24
Blade Motor	5 H.P.	5 H.P.
Pump Motor	1½ H.P.	1½ H.P.
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Blade Size	1"x14"5" x.035	1¼"x21"3" x.042
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Coolant Pump Capacity	330 GPH	330 GPH
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Band Wheel Diameter	20"	32"

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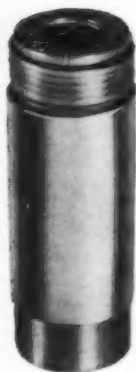
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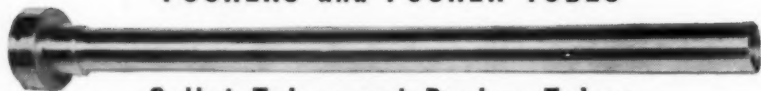
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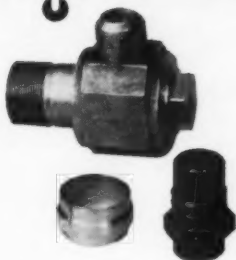
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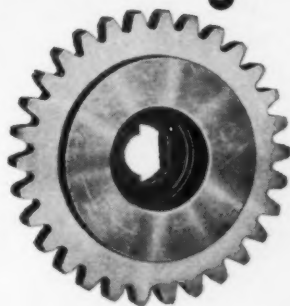


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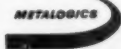


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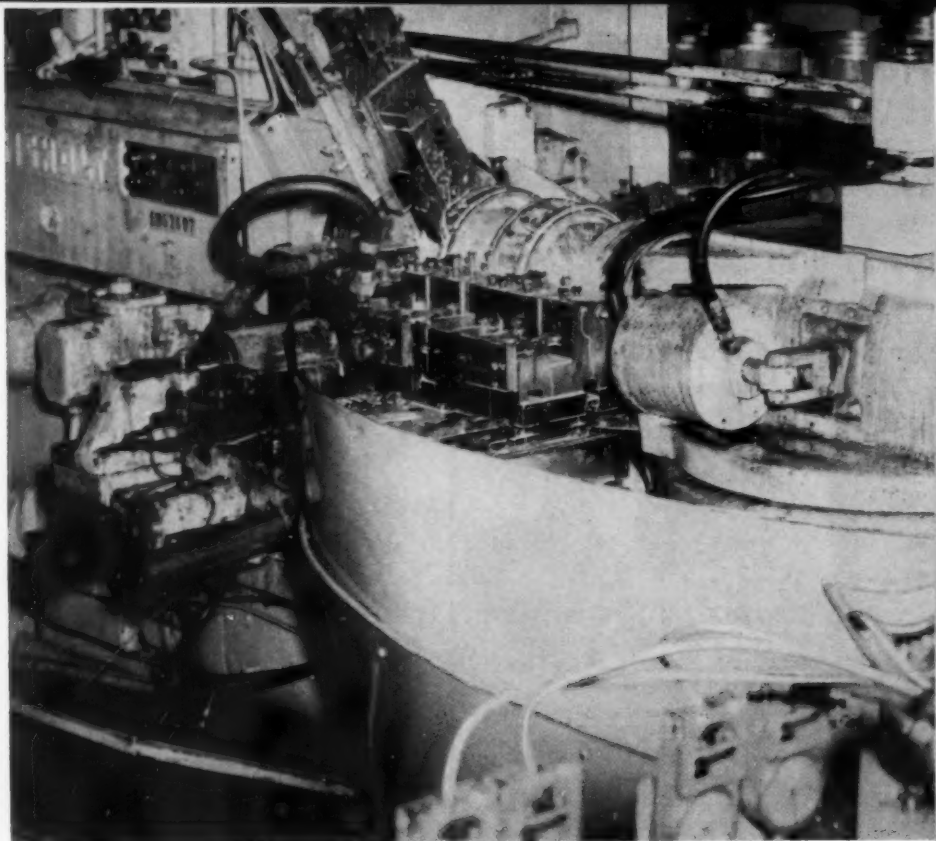


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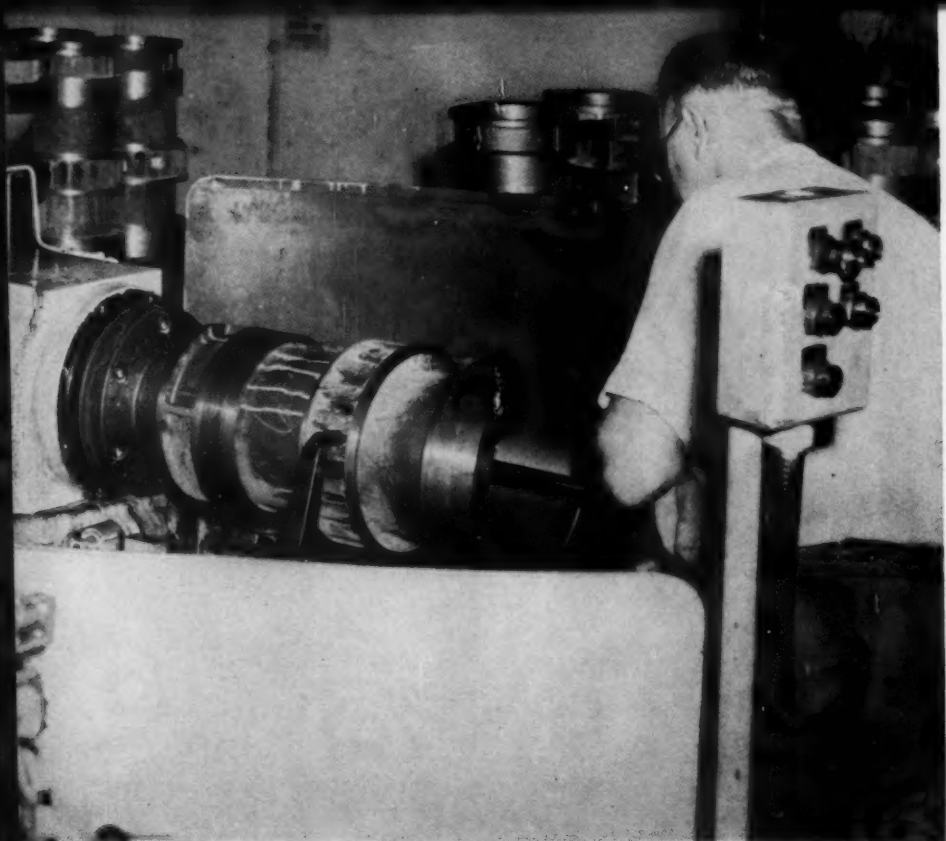
91



## DIESELS

*Here are the advanced techniques being used at Electro-Motive Division to fabricate cylinder liners*

■ Cylinder liners for several series of diesels built by the General Motors Electro-Motive Division are now fabrications of a cast-iron barrel and two steel water jackets. The liners they replace were one-piece castings with integral water jacket areas. Advantages claimed for the new design are: uniform cooling of the liners, pistons and rings, closer control of liner thickness, cleaner and unobstructed water passages between air



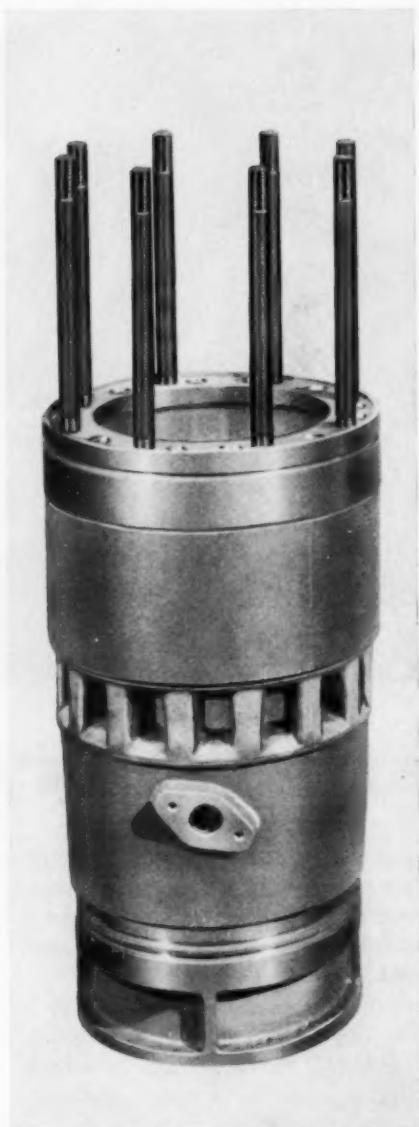
## SPORT NEW JACKETS

ports, and elimination of seven pipe plugs which were a source of bothersome leaks. Fig. 1 shows an all-cast liner (left) and one of the new fabricated liners.

Although old and new liners bear a close resemblance, the design change necessitated an entirely new manufacturing procedure. EMD's approach has encompassed advanced techniques in forming, welding, expanding, ma-

chining, surface treatment, and brazing.

Upper and lower jackets are carbon steel, 3/16" thick. Stock is sheared to 6" by 34" rectangles, then trimmed in a die in a press operation so that length can be accurately controlled. On the equipment seen in Fig. 2, the blanks are then wrap-formed around a mandrel to a circular configuration. Each half of the jacket is wrapped in turn. Both ends are forced down



1. One of the old all-cast liners (left) and one of the new fabricated liners.

against a water-cooled back-up bar, butted together, and welded, Fig. 3. A bare-wire-inert-gas method is used. (Stop tabs, or waster plates, positioned at each end of the joint prior to the wrap-forming, assure a sound weld from end to end.)

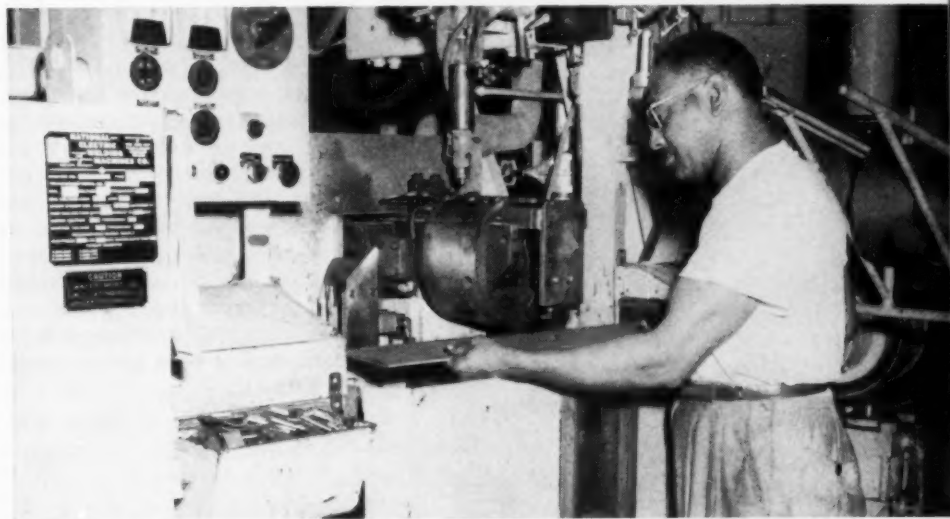
Jackets are allowed to cool, the tabs are cropped, and the weld bead is planished. This is done between two rolls which mash the weld down. Purpose of the planishing is to prevent external interference in the engine's crankcase as well as to avoid tool shock during later step boring of the jacket ends.

In the next operation, the jackets are expanded to size on the machine seen in Fig. 4. Jackets are positioned over segments which are forced out radially when a long tapered plug is pulled down by a hydraulic draw-bar. There are two work stations on

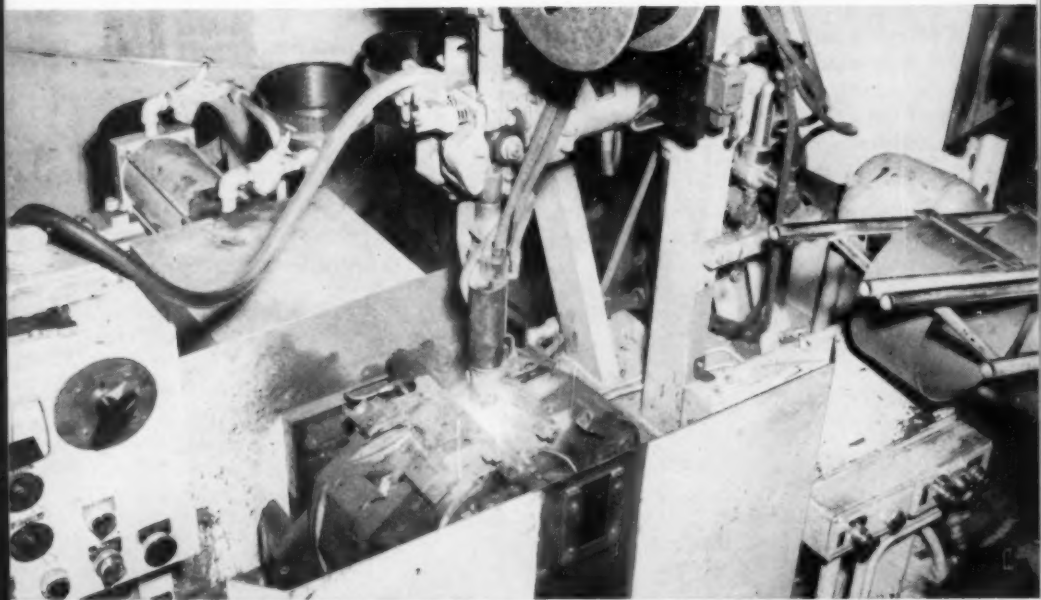
the expander—one above the other—so that it can handle either the larger, cylindrical upper jacket or the smaller, bulged and tapered lower jacket. This operation also serves as a control for the weld quality. If a weld is faulty, it will crack when the jacket is expanded.

After the plug is pulled down and retracted, the jacket is indexed slightly and the expander repeats its cycle. This erases the flats in the surface of the work left by the gaps between the segments.

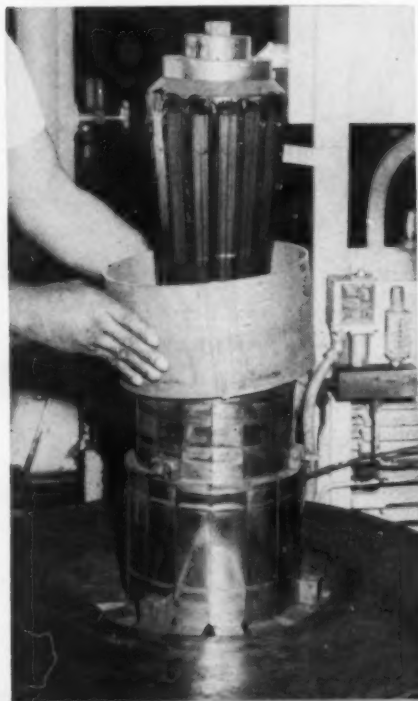
At this point, the jackets are brought to the vertical lathe, Fig. 5. Cutters on two slides simultaneously move transversely over the two edges, facing the work to accurate width. At the same time, cutters on vertical slides step bore the two ends. These steps later are the braze joints. Processing is completed when a hole for the water inlet flange is punched in



2. This machine wrap-forms each half of the blank in turn, then butt welds the edges, forming the circular jacket.



3. Both ends of the blank are clamped securely to the mandrel as the welding head feeds forward. Welded jackets are visible on right.



the lower jacket, and the work is moved to an assembly area.

The other major component of the fabricated cylinder liner, the cast-iron barrel, is 22" long, and has an 8½" bore. Its unmachined weight is approximately 150 lbs. (in contrast to the 177-lb. weight of the all-cast liner). Like the old liners, the new ones have to be bored and faced, and pilots at each end have to be turned. In addition, braze areas have to be machined at four points along the periphery.

Ends are faced, and pilots and

4. After the weld is planished, the water jacket is expanded to size. This operation also checks the soundness of the weld.



braze-area diameters are turned and produced on the Gisholt lathe seen in the heading illustration. (Rough boring has already been completed on another machine.) This lathe has been adapted with a special turret which serves as a live center. While one work-piece is being machined, the operator unloads and reloads work-pieces at the other station of the turret. The liner is gripped internally at both ends—by a chuck on the head-stock, and an expanding mandrel on the turret.

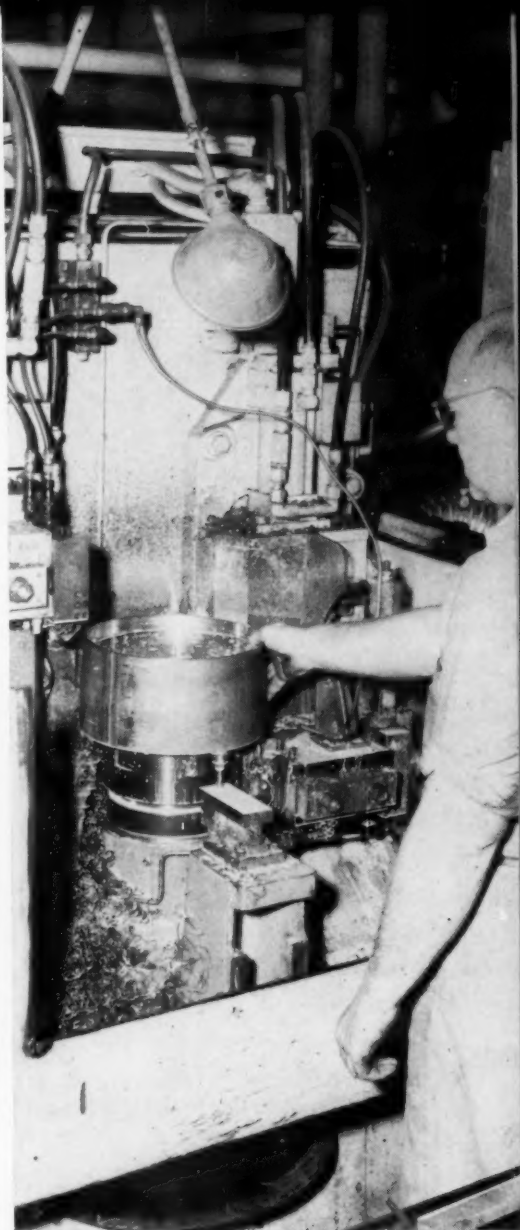
Each time the turret indexes, a hydraulic cylinder (seen on the front of the turret) simultaneously tightens the mandrel in the operative station and loosens the mandrel in the in-operative station.

In addition to the turning and facing operations, four  $\frac{1}{8}$ " grooves are plunge-cut in the braze areas. These grooves later receive silver-alloy brazing rings.

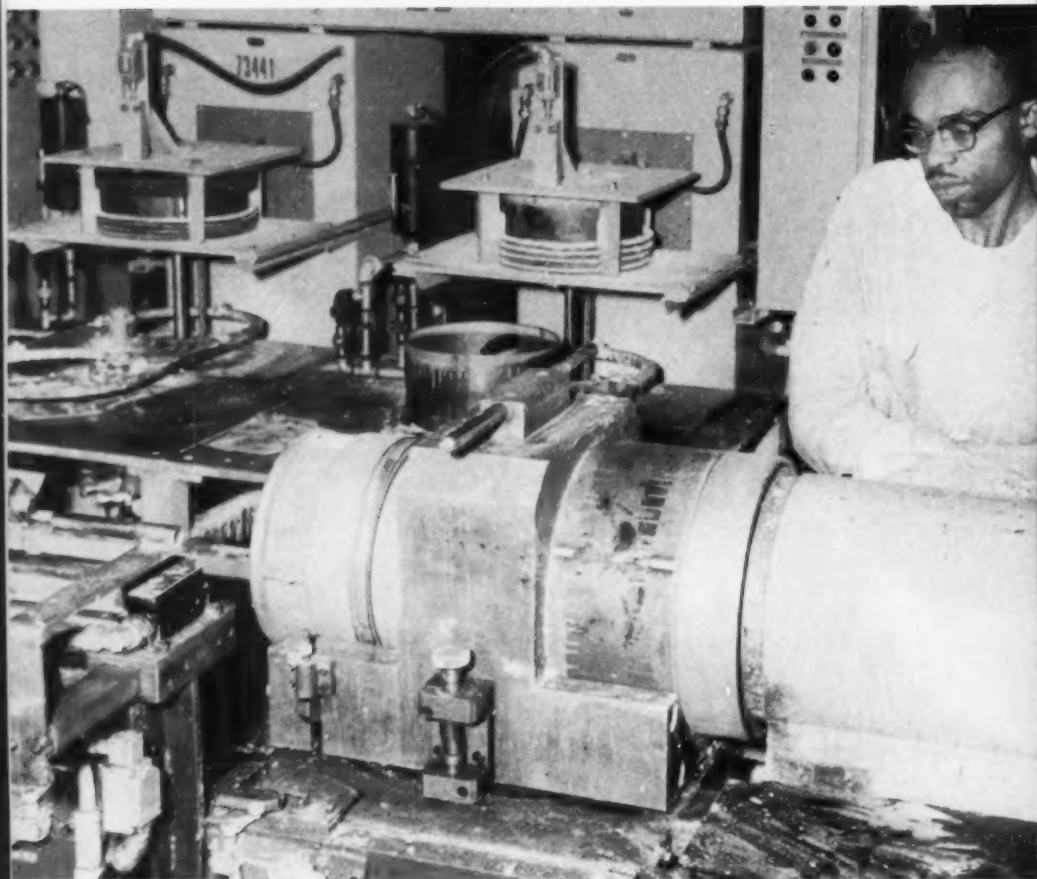
Next, the barrels enter an automatic Kolene cleaning line. Racks handle the barrels in batches of eight. In sequence, the racks go through a 600°F oven and an 825°F molten salt bath. While in the bath, current flows through the barrels, oxidizing the graphite in the castings and removing surface scale and dirt. When the liners leave the bath, their surface is virtually pure iron, in optimum condition to receive the brazing alloy. The cleaning cycle is completed with cold and hot rinsing.

Braze rings are now snapped into the grooves and the barrel proceeds to the assembly station, Fig. 6. There it is loaded in the fixture seen in the foreground.

This fixture slowly rotates the bar-



5. This lathe operation controls jacket width and produces the braze area steps.



6. While the barrel is being rotated and fluxed, the upper and lower jackets are expanded by induction heating for the shrink fit.

rel while four nozzles underneath spout flux onto the braze areas. After about  $1\frac{1}{2}$  revolutions of the barrel, the flux has been properly applied, and the nozzles drop clear. The operator is then ready to shrink fit the jackets onto the barrel.

The two induction heating units for expanding the jackets also can be seen in Fig. 6. After the jackets are

coated to prevent the braze surfaces from oxidizing, they are loaded onto a two-station turntable under the inductors, indexed into position, and elevated. Current is applied for a preset time, after which the jackets are lowered and indexed for unloading.

The fixture used for fluxing the barrels also is used for assembling the jackets. Immediately next to one end

is a turntable carriage. In this way, both jackets are pressed over the same end of the barrel: The larger jacket is pressed on first, the fixture is indexed 180°, and the smaller jacket pressed on.

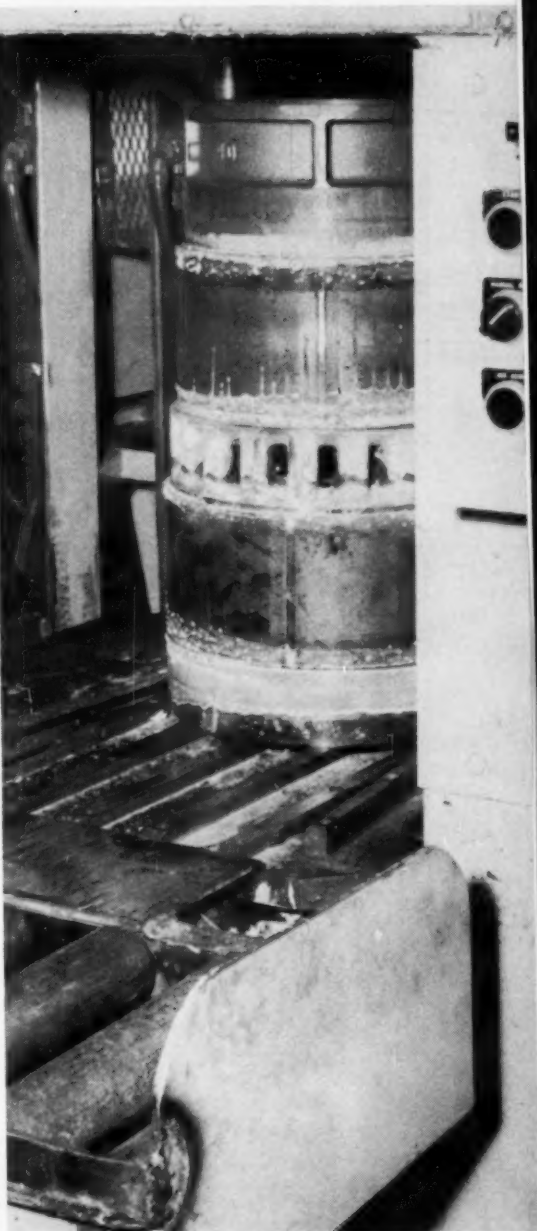
Brazing is next. Liners move through a preheating oven operating at 750°F, emerging after approximately 30 minutes. Temperature of the liner upon exiting is about 600°F, and it is moved by roller conveyor to an induction heating station, Fig. 7.

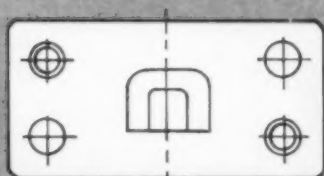
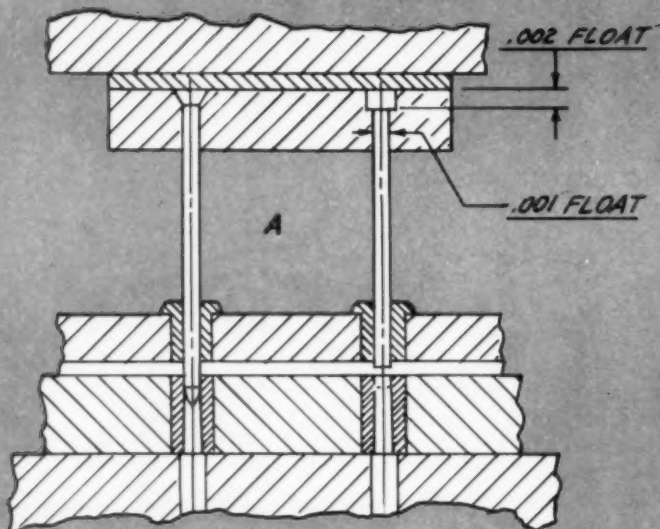
When the liner is elevated to position at this station, it is inside three inductors (coils), one at the upper braze joint, one at the two central joints, and one at the lower joint. There is also a fourth inductor, inside the bore which introduces sufficient heat so that cooling will be uniform and the braze joints are not stressed on solidifying.

The liner is in the induction station about 3 minutes for the joints to reach the temperature for brazing. During the interval, the liner rotates at about 20 rpm. When it is removed, it is air-cooled under a bell-shaped can which helps to equalize the heat. While under the can, the liner travels back through the preheating oven, emerging after one hour. The inlet flange is now welded to the lower jacket. Liquid blasting follows.

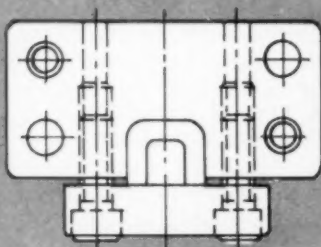
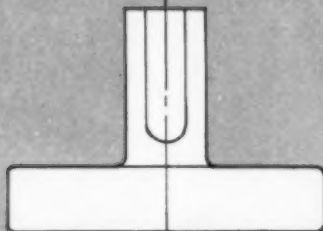
Subsequent processing of the fabricated liners involves broaching, boring, turning, and honing, then testing and inspection. These operations are unchanged from those performed on the all-cast liners. • • •

7. This liner is exiting from the induction brazing equipment. Its braze areas still are glowing. The liner will be cooled slowly as it backtracks through the preheating oven

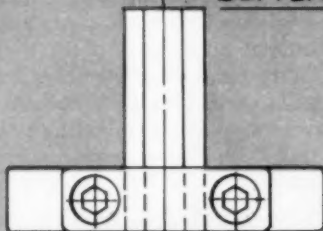




POOR



BETTER



**B**

1. For light- and medium-duty, round punches and pilots should float, and should take the form of headed pins, guided by bushings. Rectangular and contour punches and pilots should be of through-grind design wherever possible, for simplicity, accuracy, and low cost.

# A CHECK LIST for Evaluating Progressive Dies\*

By **R. J. Rizzo**  
Consulting Engineer

■ Over the years I have observed repeatedly that die shops of equally high caliber, when given the same job, will come up with dies which are surprisingly similar in design—even though the shops may have worked independently and in widely separated locations. This phenomenon, supported by countless similar personal experiences in the tool room, has convinced me that in die design there is only one best solution to a definite problem.

The hypothesis is simple: Given a stamping of fixed dimensions, tolerances and material, the required hourly production, the punch press to be used, the cost per piece, the desired production per die run, the press strokes per minute, the over-all life of the die, the burr side, flatness and finish requirements of the part, etc. . . . only one design of die will satisfy the requirements best.

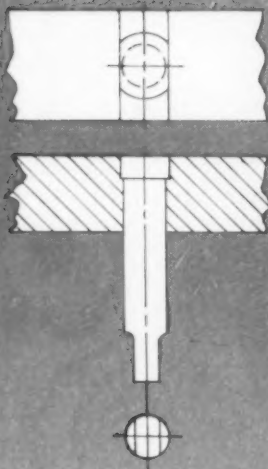
To those who disagree and insist there is more than one way to skin a cat, I reply, yes, other dies of different

design, cost, and materials will produce parts, all right, but each of these inevitably fails to satisfy one, several, or all of the original conditions. The deficiencies become apparent later, in the form of premature punch failure, excessive die wear, difficulty in set-up, early misalignment and burring, difficulty in repair, non-uniformity of work, faulty slug ejection, abnormally short runs, and many other manifestations.

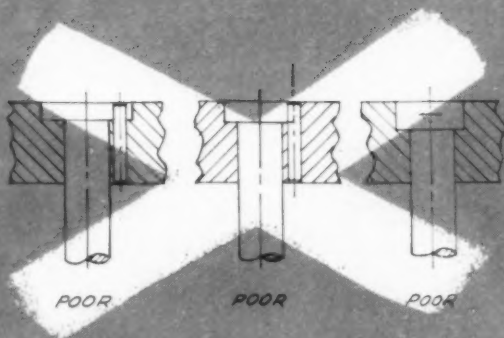
For two individuals working independently on the same problem to produce strikingly similar results, die design must, of necessity, be governed by fixed universal rules. The following check list comprises a few of them which have served me as guides over the past twenty years. They have proved invaluable in evaluating not only my own designs and those for which I was directly responsible, but also others which were submitted from outside sources for criticism.

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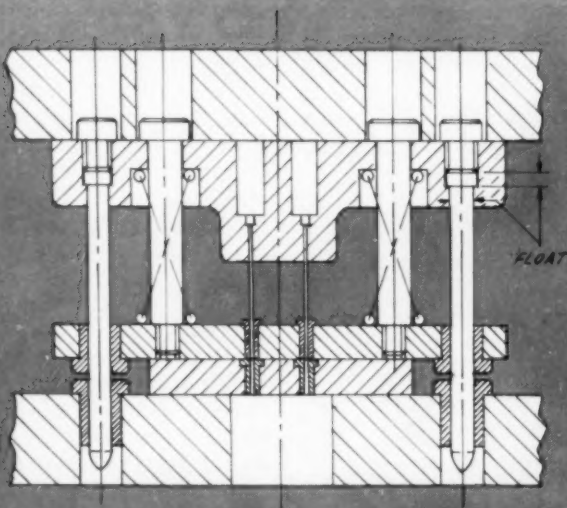
\*Copyright, 1961, R. J. Rizzo



GOOD



2. Directional perforating punches having round shanks should not employ a "dutchman" pin for orientation. Instead, flats should be ground on the punch head which fit into a channel ground into the back of the punch plate.



3. Besides floating, fragile piercing and trimming punches should employ spring-loaded pads wherever possible, each pad in turn being guided by pins riding in bushings in the pad and die to assure accurate alignment at all stages of die life.



## A CHECK LIST FOR EVALUATING PROGRESSIVE DIES

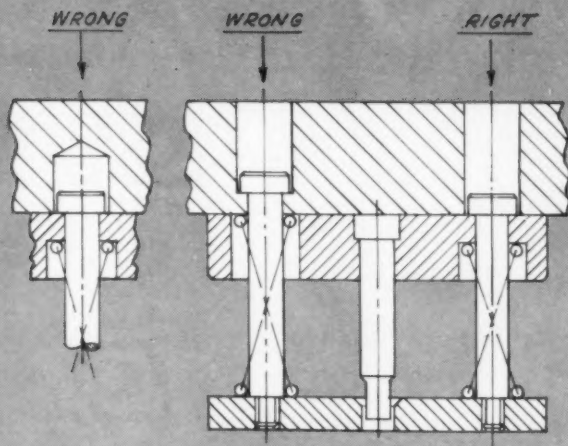
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- 1 Examine the design philosophy of the die. Does it suit the general intent and requirements of the job and the methods and habits of the press room? Is the die overdesigned in these respects? Underdesigned?
- 2 Does the design provide the substance needed for continuous burr-free production throughout the life of the die?
- 3 What about maintenance features? Will dismantling, sharpening, or repair be a nightmare and require all day to accomplish? While considering these aspects, put yourself in place of the man on the bench. How would **you** like to have to repair this die?
- 4 Would a misfeed cause serious damage? If so, has any provision been made through the use of automatic electrical safety devices to safeguard the tool against this?
- 5 Is the design weak in alignment features? If so, remember that serious trouble is sure to appear after initial wear has occurred and punch replacement is necessary.
- 6 What about the choice of die set? Using a precision four-post set is not a cure-all. Regardless of the cost or design of this component, it cannot furnish accurate alignment of working members if this feature is not already designed into the die itself. Often, with proper die design, a commercial grade two-post set will provide sufficient accuracy plus better accessibility than a four-post set.
- 7 Is the stroke of the press compatible with the die? Is it too long for die speed and punch life? Too short for strip feed or part ejection? What is the age of the press? Its condition? Will it throw the new die into misalignment and shear it right from the start? Will the press permit repeated precision setups under normal conditions, or will it require a "miracle man" to do the setting?
- 8 Are the form characteristics of the stamping critical? If so, have set blocks been provided in the design?
- 9 Examine the piloting principle. No design should be released without having pilots of adequate size at strategic locations. Does this die have enough pilots, but not too many? Should any of them be spring-loaded?
- 10 What provisions are there for starting the die? Is the first stop position indicated for the convenience of the set-up man? Without means for accurate starts, some dies could be wrecked in the first few strokes of the press.
- 11 How is the die block subdivided? Has this important aspect been given enough attention? For example, have cutting sections been



## A CHECK LIST FOR EVALUATING PROGRESSIVE DIES continued

- isolated from non-cutting members for economy of replacement? Or, have dividing lines been located at such points as to produce, for example, symmetrical left-hand and right-hand sections where possible, to facilitate fabrication and grinding?
- 12 If die sections are framed in a chase, is design of the chase such that it is independent of dowels for rigidity? Although it is constructed of heat-treated tool steel, does it provide means for precision alignment with the stripper?
  - 13 Determine if the design would be improved with the die block (or chase) "set in"  $\frac{1}{8}$ " or so. Dowels alone cannot substitute for setting in when it is necessary.
  - 14 Is the die block (or chase) the member that is tapped for holding it down? It should be. What about the dowels in this part for alignment with stripper and die set? How many are there? Are they located properly?
  - 15 For light- and medium-duty, round punches and pilots should float, and should take the form of headed pins, guided by bushings. Rectangular and contour punches and pilots should be of through-grind design wherever possible, for simplicity, accuracy, and low cost. See Figs. 1a and 1b.
  - 16 Marking, scoring, and other punches having critical height relationships should be provided with means for individual adjustment in the press if normal adjustment by ram screw cannot be employed, or when a multiplicity of such punches exists.
  - 17 Does the tool drawing call for precision lapping of mating faces of die sections? In dies having many stations, cumulative errors will occur each time the die is reassembled unless these faces are so finished. Also, it is a good idea in this connection to specify target dimensions from a datum point at the first station to pilot holes and other check points along the way to assure accurate registration after assembly.
  - 18 What about punch retention? Where advantageous, punches should be made replaceable in the press. To accomplish this, sliding key pins or clamp plates may be employed. In any case, punches should be arranged conveniently in groups to simplify mounting and repair.
  - 19 Directional perforating punches having round shanks should not employ a "dutchman" pin for orientation. Instead, flats should be ground on the punch head which fit into a channel ground into the back of the punch plate. See Fig. 2.
  - 20 How are fragile piercing and trimming punches guided? Besides floating, these should employ spring-loaded pads wherever possible, each pad in turn being guided by pins riding in bushings in the



4. Where a spring pad is used for a punch group, it should be possible to remove the punch plate without first removing the pad.

pad and die to assure accurate alignment at all stages of die life. See Fig. 3.

- 21 Where a spring pad is used for a punch group, can the punch plate be removed without first removing the pad? This should be possible. See Fig. 4.
- 22 Do punch plates have tapped holes rather than clearance holes for fastening to the punch holder? They should.
- 23 What design have the strippers, stock guides, lifters and ejectors? The failure of many progressive dies to operate successfully at rated speed is due invariably to improper design of these components.
- 24 Are springs visible wherever possible? If a spring should break in use, can it be detected and replaced quickly?
- 25 Have idle stations been provided? An idle station can be a life-saver sometimes when a station must be shifted, a new hole punched in the strip, an additional drawing operation added, or the cut-off moved farther from the last forming station—among other reasons.
- 26 What about the slug problem? Has each slug shape been studied? Have side-trim slugs been provided with special hold-down means? Slugs which back up can cause severe damage to the die. • • •

# Innershield Squirt Welding

## DOUBLES DOUBLES

## Production

*Vapor shielded cored wire with automatic feed keeps assembly of 7/8" plate cooling boxes ahead of installation schedule*

By **Henry J. Dubina,**

Vice President and Plant Superintendent  
Hibben & Co., Chicago, Ill.

■ Changing from manual stick welding with iron powder electrodes to Innershield Squirt welding, a new semi-automatic vapor shielded welding process developed by the Lincoln Electric Co., Cleveland, doubled daily production of all-welded cooling plate boxes for a blast furnace brick lining. The parts of the blast furnace cooling system were prefabricated and subsequently installed at one of the Chicago area steel mills by Hibben & Co., steel plate fabricators and erectors.

There were deposited on each of the 229 boxes making up the system 19½' of 5/16" lap and fillet welds. The welds attached the outer 30" by 22" rectangular cooling plate to the sides, top, and bottom of the box.

The 7/8" plate has a 22¾" by 20" cutout and eight 1" holes drilled around its periphery for bolting on a

½" cover. This gives access to the interior of the box after installation and facilitates economical shop fabrication. The box members are attached to the furnace shell by field welding.

Originally, the boxes were shop welded with a 7/32" Jetweld 1, a 50% powdered iron, coated production electrode for manual welding, using 300 amps direct current, positive. It was possible to assemble between five and six units daily. With the introduction of the Innershield Squirt welding and a NS-3 electrode, the same crew produced eleven boxes a day.

The five parts of the assembly are pretacked with Jetweld 2 (E-6027) rods, then simply transferred to tables for finish welding. Although tolerances on final assembly do not demand close fitup of parts, this proves no problem in maintaining production welding speed, since the characteristics



1. Innershield Squirting welding, a new semi-automatic vapor shielded welding process, doubled daily output of these blast furnace cooling boxes.

of the welding electrode being used are suited to handling poor fit.

A manually held welding gun feeds the .125" electrode at a machine setting of 500 amps direct current, positive, 32 arc volts. Welding speed varies upward of 18 ipm. Gun manipulation closely duplicates manual welding with stick electrodes, and operator training

takes only a few hours practice. The weldor must simply learn to point the 24-oz. gun, adjust travel speed to obtain the desired fillet size, and maintain a uniform distance between the gun tip and the work. This can be done with one hand. A trigger on the gun handle controls weld starting and stopping. Current supplied by a motor



2. Operator stacks cooling boxes after assembly. In foreground is the welding apparatus.

generator power source is controlled by speed of the wire feed.

A major factor initiating use of the new process at Hibben was the simplicity of substitution for hand welding equipment. No new fixtures or positioning equipment have been needed. In fact, part handling is simplified since fillet welds too can be deposited in the horizontal position with Innershield Squirt welding, whereas obtaining maximum welding speed with manual electrodes demands positioning all welds flat.

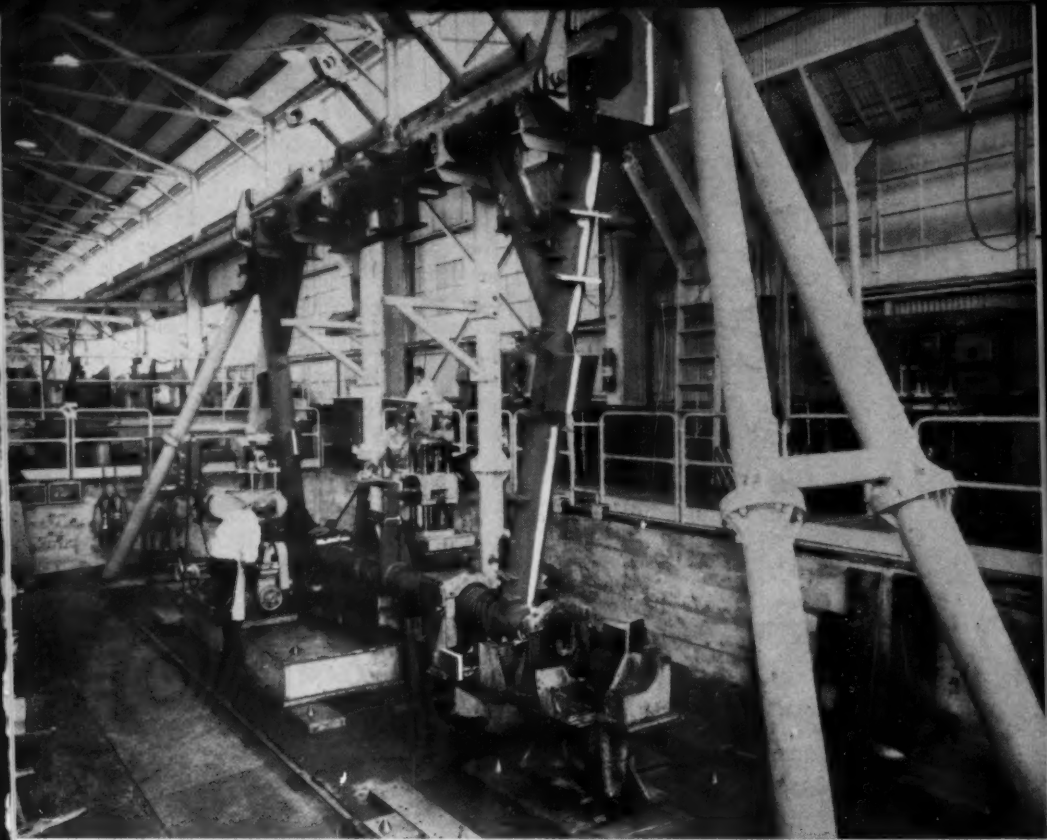
Key to the new welding process is the Innershield flux-cored electrode wire which is completely self-shielding, eliminating the need for external flux or gas. First introduced as a high-speed fully automatic process for thin-gage material, the wire has been modified for semi-automatic welding. Flexibility and adaptability of the new process equals and in some cases exceeds the performance of iron powder manual electrodes.

Essentially, the mild-steel tubular wire provides filler metal with enclosed ingredients for shielding, deoxidizing, and fluxing. Some of these are metallic salts and oxides which have these basic properties: (1) become molten at temperatures lower than the melting point of the wire; (2) boil and generate vapor at a temperature below the melting point of the wire; and (3) chemical inertness.

Introducing these materials into the heat of the arc causes them to vaporize and expand. As they reach the isothermal cone surrounding the arc, they recondense to form a relatively thick vapor blanket around the arc and over the weld metal pool. Other materials in the electrode wire provide oxidizing and scavenging functions to produce a dense weld deposit with good physical properties.

Equipment for the process is compact and simple to operate. An apparatus containing electrical controls, a 50-lb. reel of wire, and drive rolls feed the wire and current through a cable to the welding gun. The latter is actually little more than a nozzle, an actuating trigger, and a pistol grip.

• • •



OVER-ALL VIEW shows how giant frame for Atlas missile ground support equipment is fixtured for machining. Machining units are moved from position to position by overhead crane.

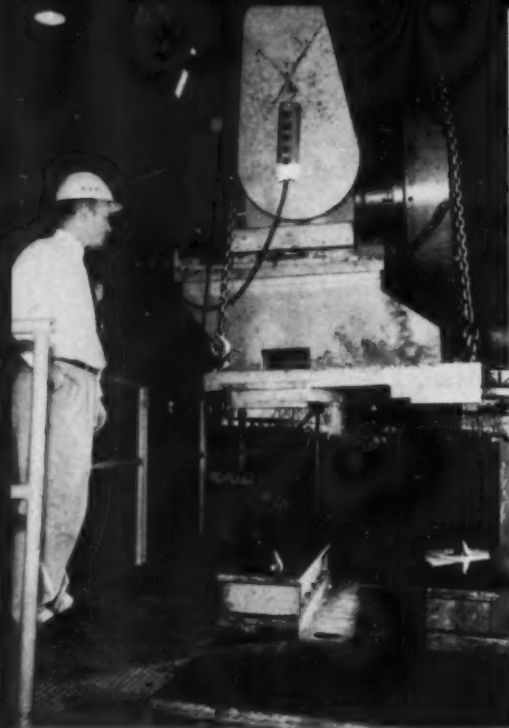
## Here's One Way to MACHINE UNWIELDY WORK

■ Machining surfaces on large, awkward, fabricated steel structures, such as launching frames for Atlas missiles, has challenged the ingenuity of many a methods engineer. The size and weight of items of this type are such that moving them from place to place

for various machining operations is not only uneconomical—it's dangerous.

A unique method for doing the job efficiently, chosen by Consolidated Western Steel Corp., Maywood, Calif., is shown above. Machining units are





**LOCATING CONES** assure correct positioning.

**TOOLS ARE NOT CHANGED** from milling, to boring, to facing. Three machining units are employed, one for each operation.

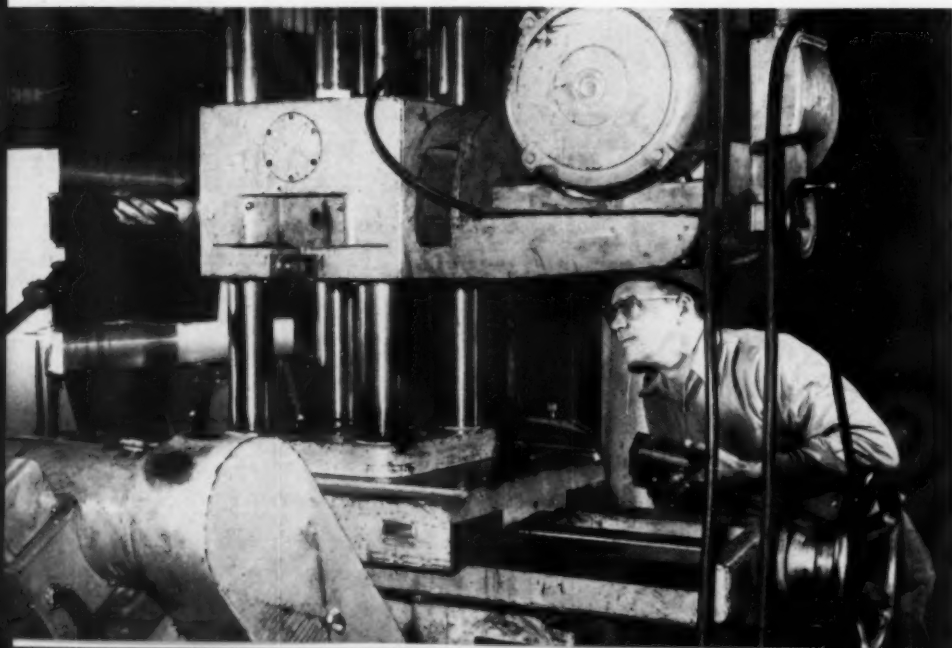
used that are positioned quickly around the stationary structure for milling, boring, and precision facing operations.

According to G. R. Robins, supervisor of tool design, pallets were located around the frame and steel locating cones were sunk into the pallets to exact specifications. Bases with female end connections were then fitted to three machining heads having integral feed tables made by Master Mfg. Co.

One unit bores, one mills, and one faces. Any of them can be moved by overhead crane from position to position around the frame in a matter of minutes with the knowledge that each position is correct.

The firm has had no problems since initiating this method of machining. Close tolerances are maintained and the positioning time is not excessive.

• • •





**BB**

# **NOMOGRAPHS**

## **for**

# **Tube-Bending Mandrels**

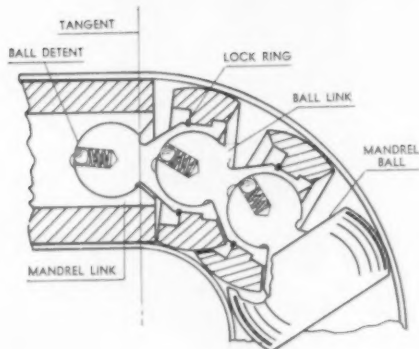
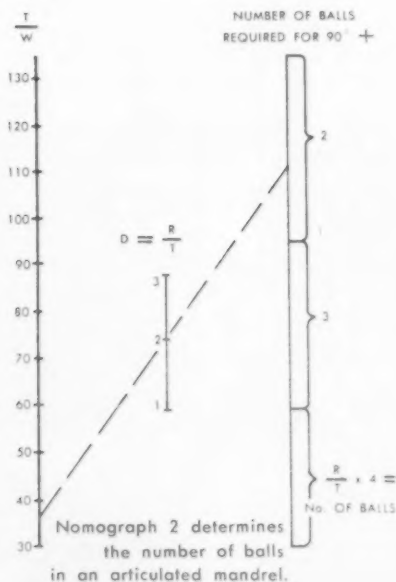
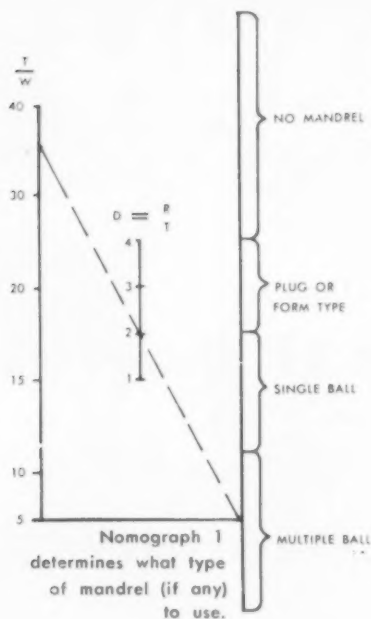
■ The tube-bending mandrel is an essential tool, and is used when the bend radius is such that it causes the tube to collapse or buckle. It is also required when the ratio of wall thickness to tube diameter becomes too great. In bending thinwall tubing, it is sometimes necessary to use a wiper die in conjunction with the mandrel. The wiper die is used to support the material from the outside of the tube, on the inside of the bend, as it is being pulled over the mandrel.

The accompanying nomographs indicate when a mandrel is needed (Nomograph 1), and if so, the type of mandrel to use (Nomograph 2). As a preliminary step, two ratios must be established:

$$\text{THICKNESS RATIO} = \frac{\text{Tube O.D.}}{\text{Wall thickness}} = \frac{T}{W}$$

$$\text{BEND RATIO} = \frac{\text{Center line of bend radius}}{\text{Tube O.D.}} = D$$

In using Nomograph 1, divide the diameter of the tube by the wall thickness. If the quotient is 40 or less, and the bend ratio is 4 or less, draw a straight line from the



Cross-section drawing of a Uni-Flex articulated (ball type) mandrel, showing how it flexes inside a tube during the bending operation. According to the manufacturer, 1-D tangent bends are possible. Spring-loaded detents inside the sockets maintain alignment when the tube is removed. Ball segments are free to rotate, equalizing wear. The ball-and-socket design makes it possible to go down to sizes previously claimed to be impractical to manufacture. Satisfactory mandrels for bending  $\frac{1}{4}$ " O.D. by .014" wall 350 stainless steel tubing are now in use.

proper ratio number on the left through the bend ratio to the line diagram on the right.

Example:  $1\frac{1}{2}$ " diameter tube by .042" wall, 3" center line radius

$$\text{Thickness ratio} = \frac{1.5}{.042} = 36$$

$$\text{Bend ratio} = \frac{3.0}{1.5} = 2$$

When the ratio  $\frac{T}{W}$  is greater than

40, a multiple-ball mandrel is used, and it is only necessary to refer to Nomograph 2 to determine the number of balls required. Draw a line from left to right, intersecting the bend ratio.

• • •

**B  
B**

## LUBRICANTS AND COOLANTS

by Allen F. Brewer

# Many Methods of APPLYING Lubricants

■ Automatic lubrication is generally advisable wherever practicable on modern machine tools. Normally it is built into the machine itself or otherwise designed to be a part of the machine. There are certain very definite benefits to be derived from automatic lubrication:

**Regulated Delivery of Lubricant**—Too much lubrication often can be just as harmful as too little. Accordingly, the most suitable means of lubrication is the one which is provided with feed regulation adaptable to the machine, to the type of lubricant to be used, and to the operating conditions. Self-adjustment of the amount of lubricant, according to the rate of supply desired, is an adjunct.

Typical of such a system would be the oil circulating rollers which are installed in the bedplate over which a lathe carriage travels. Motion between these surfaces is relatively slow but the pressure can be high. Lubrication is maintained by contact of the sliding surface of the carriage with these rollers which constantly carry a film of oil. The rollers turn in a reservoir of oil. In other designs, oil can be furnished to similar sliding surfaces under

*Too much lubrication can be  
just as harmful as too little*

pressure, with means for continual filtration and re-circulation.

**Dependable Continuity**—The mechanical force feed oiler was one of the first devices developed to assure application of oil to moving surfaces in contact with one another, at a rate according to the speed of the moving part by means of a ratchet or link mechanism. Pumping action and delivery of oil occurs only when motion prevails, at a rate controlled by adjustment of the plunger stroke.

Continuity of lubricant application quite naturally must be dependable, but in the interest of preventing waste it must be controllable. The mechanical force feed oiler exemplifies this. Conversely, some wick-feed drip-type oilers are designed to function on the syphonic principle. While entirely automatic as long as the wicks dip into a sufficient supply of oil in the reservoir, they must be manually regulated by an adjustable feed attachment to obviate continued oil drip through capillarity when the machine is stopped. Both of the above methods involve once-through lubrication—there is no re-circulation of the oil.

**Pressure Available**—Pressure lubrication goes hand-in-hand with automatic application of either oil or grease. When the lubricant can be applied or circulated under adequate pressure there is positive assurance that it is

reaching all bearing clearances and completely covering all the teeth in a train of gears. An added benefit is that the lubricant also acts as a flushing agent to remove possible accumulations of abrasive foreign matter or sludge from oil grooves in a bedplate or bearing, or from the lubricant delivery system in case of entry of dust, dirt or moisture.

Pressure lubrication can be either measured or flood type. An automatic centralized pressure grease system combines both timed and measured lubrication. Such a system is designed to pump a measured amount of lubricant to each fitting on a predetermined time schedule. The amount of lubricant delivered is controlled according to the bearing requirement, by the displacement adjustment of the injector or dispensing valve. When bearings are equipped with suitable seals to prevent leakage of grease (under application pressure) or entry of non-lubricating foreign matter, such a system is dependable for uniformity of operation and reliability. Other advantages include virtual elimination of personal hazard to operators and maximum utilization of the lubricating ability of the grease with no necessity for machine shut-down for manipulation or adjustment of the system. The basic design requires the pump to deliver lubricant from the central storage container to the main line

piping which serves the injectors or dispensing valves. These in turn deliver the required amount of lubricant to the discharge lines which are connected to the bearings or other mechanisms requiring lubrication. The modern centralized pressure grease system can be built with either single or dual lines. As the single line system has only one main line, each bearing receives a shot of lubricant on each pumping cycle. The dual line system is more progressive in that each of the dispensing valves operates progressively, each one functioning before lubricant can be passed to the next.

Centralized pressure also can be adapted to automatic metering of oil with adequate control of delivery. When the dual line idea is adapted to oil, the circulation feature prevails in that oil can be returned by gravity to the central source of supply for re-usage. Application of lubricant under widely varying pressures (up to around 5000 psi) features both types of such systems. Low pressure normally suffices in a simple pressure circulating system, the oil being pumped to the bearings at pressures from 5 to 15 psi. This involves cyclic lubrication since the oil is pumped in

#### MACHINE TOOL SERVICE LUBRICATION CHART

Lubricating System	Typical Service	Typical Lubricant
Oil Circulation by Roller or Pressure	Ways, Guides and Slides on Lathes, Planers, Shapers, Slotters, Boring Mills and Drills	Machine Oil, EP Type Viscosity Range 150-350 Seconds
Splash or Dip	Enclosed Gear Trains, Head-stock Gears, etc.	Machine Oil, Straight Mineral or Additive Type. Viscosity Range 300-600
Pressure Oil Circulation	Enclosed Bearings	Machine Oil, Viscosity Range 150-350
Metered Lubrication		
Wick Oiling	Milling Machine Saddles and Sliding Ways	Machine Oil, High Quality Viscosity Range 75-350
Oil Mist, Fog or Vapor	High Speed Bearings in Grinding Service	
Pressure Grease Gun	Ball or Roller Bearings	Oxidation Resistant Ball or Roller Bearing Grease, NLGI No. 1 or 2*
Centralized Pressure	Enclosed Systems	

\*National Lubricating Grease Institute.

**Note:** All viscosity ranges in seconds Saybolt Universal at 100°F.

*Safety should be considered when  
selecting the lubricating system*

a continuous cycle through the bearings, being filtered and cooled after each passage, prior to re-circulation.

**Flood Lubrication**—Flood lubrication is typified by the enclosed oil circulating system. This is well suited to the type of housing used on the typical universal turret lathe, for example, which is provided with an oil reservoir from which the oil pump circulates oil to the turret saddle, aprons, cross slide ways and bedways. In other types of lathes, the headstock gears are similarly lubricated by a flood of clean cool filtered oil. To complete such a system, oil level and sight gages are provided to denote the volume of oil in the reservoir.

Flood lubrication also can be developed by splash. Like force feed oil circulation, it assures an excess of oil continually covering the operating contact parts. Splash lubrication is best suited to enclosed headstock gears, for example, which are run so that they dip in a bath of oil. This type of lubrication is positive; it assures against abnormal wear and provides a certain amount of cooling and flushing which contribute to reduction of noise.

Since the oil volume in a continuous system is limited, the oil must have maximum lubricating ability and resistance to chemical break-down and oxidation. Comparatively low viscosity from 150 to 350 seconds Saybolt Universal at 100°F, in accordance with

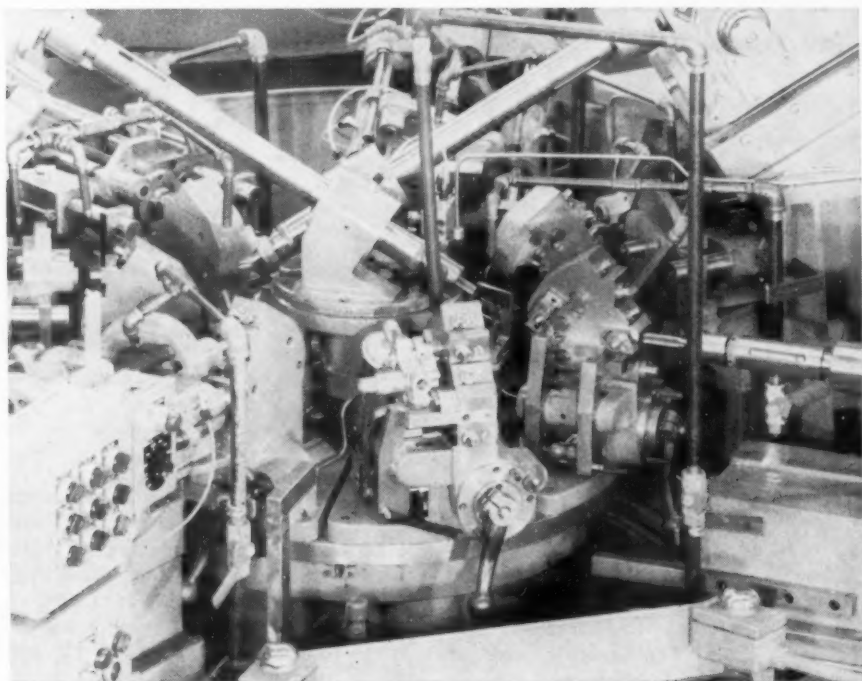
the system requirements, normally is suitable. When maximum stability is desired, an oil containing oxidation, rust, and foam inhibitors should be considered. Enclosed splash lubricated headstock gears required a heavier oil from 300 to 600 viscosity.

**The Safety Factor**—This will depend upon the extent to which the operator, the maintenance man, or millwright has to work adjacent to the moving machine when adjusting or re-filling lubricating equipment. A hand operated grease gun designed for individual servicing of grease fittings could involve more hazard, if it has to be attached to "hard-to-get-at" fittings, than a centralized system. The same would hold true if the re-fill point on an oil reservoir is not readily accessible. Good practice calls for servicing of such details when the machine is idle, but if production requirements are heavy there may be the temptation to "take a chance." The other alternative could be to neglect this phase of lubrication—then hazard could apply not only to the machine in the form of starved lubrication, but also to the operator if unexpected failure occurs.

Consideration of safety is one of the responsibilities of the designer; it also is a responsibility of the plant maintenance department. Both should study the location of machine lubricating equipment, the positioning of fittings and dispensing or control valves.

A plant lubrication engineer, when available, fits into this picture very nicely as it should be his responsibility to impress upon all concerned the importance of safety. In consultation with the designer he can advise as to the most suitable type of lubricating system and the subsequent location of the necessary lubricating fittings and

any accessory piping or controls. When the lubrication system is enclosed and all external elements are judiciously located so as to be apart from possible damage by careless handling of tools, materials, or overhead crane chains, the safety of the lubrication procedure as well as the machine operator is assured. . . .



A pair of criss-crossed extended spindles, piloting in a post over the table center, is an unusual feature of this Kingsbury dial type machine. The part, an oil-pump body, is drilled, spotfaced, formed, reamed, and tapped at a gross rate of 200 per hour. The 30" table holds seven work fixtures. Five horizontal heads operate on the relief-valve hole. Starting inside that hole is a small angular hole that is drilled by a unit in the rear of the machine mounted 33° downhill. The criss-crossed spindles reach over the machine to drill and tap the dry-seal hole. . . .



# ONE SLIDE Operates Two Others

By **L. Kasper**

■ On a wire fabricating machine, it became necessary to install two tool slides in addition to the slide presently in use. The two additional slides were required to operate at different strokes and at different timing from the original slide. The only source of power which could be utilized was the shaft which operated the original slide, but, by the use of linkage, the required movement was accomplished. Fig. 1 is a plan view of the arrangement, and Fig. 2 is an elevation.

Slide **A** is the original; those added are slides **B** and **C**. Shaft **D**, rotating

in the direction indicated, carries lever **E** keyed to it. In the other end of this lever is fixed pin **F**, which in turn carries free-running lever **G**, which transmits motion to slide **A**.

Lever **I** is pinned to pin **F** in the position shown in Fig. 1. Pin **J**, on lever **I**, carries free-running lever **K** which transmits motion to bellcrank lever **L**, which is free-running on a stud in a stationary part of the machine. Lever **L** transmits motion to slide **C** through rod **M**. Rod **N** transmits motion from lever **K** to slide **B**.

In Fig. 1, the parts are shown in

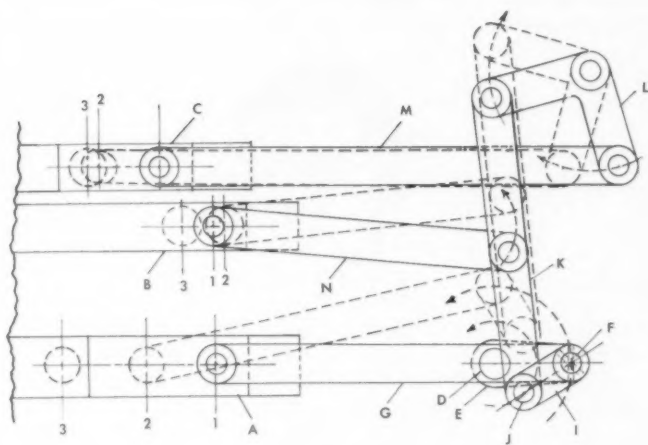


FIGURE 1

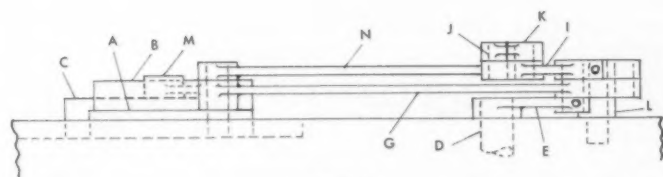


FIGURE 2

solid lines at the beginning of the cycle; the centers of the shaft **D** and pin **F** are in alignment with the center of slide **A** at this point.

The broken lines show the positions of the components after part way through a cycle. Three positions of the centers of the studs in the slides are indicated by the center lines 1, 2, and 3. As shaft **D** has rotated to the position shown in broken line, the stud in slide **A** has moved from position 1 to position 2. Due to the position of lever **I** relative to lever **E**, the stud on slide **B** has been moved to position 2 and returned to position 1.

This is caused by the fact that, due to the position of stud **J**, the operation of lever **K** in either direction is always later at any point in the cycle than the movement of lever **E**, and must pass the center line before the reverse movement begins.

The movement of lever **K** has caused lever **L** to be moved to the position shown in broken line. On the completion of the cycle, the total movement of slides **A** and **C** will be from position 1 to position 3, and on slide **B** the movement will be from position 2 to position 3. • • •

**B  
B**

## CUTTING TOOLS

By **W. E. Montgomery**  
Chief Engineer  
Carbide Division  
Firth Sterling, Inc.



# The Case for HONING Carbide Cutting Tools

■ Based strictly on a theoretical evaluation, the best cutting tool geometry for cutting metal, or anything else for that matter, is that which presents the most acute edge angle to contact with the work piece. Carried to its extremes, this would result in the use of the highest possible rake and relief angles and the flank angle of all cutting tools would be as small as possible. With such a tool, if it were practicable, cutting forces and tool wear would be minimized and surface finish on the work would be excellent. However, consideration of the strength of cutting tool materials precludes the possibility of using such optimum tool character. Accordingly, we must make some compromise with ideal geometry to protect the tool from structural failure. The degree of compromise is inversely proportional to the strength of the tool material; it is particularly pronounced in the use of tungsten carbide.

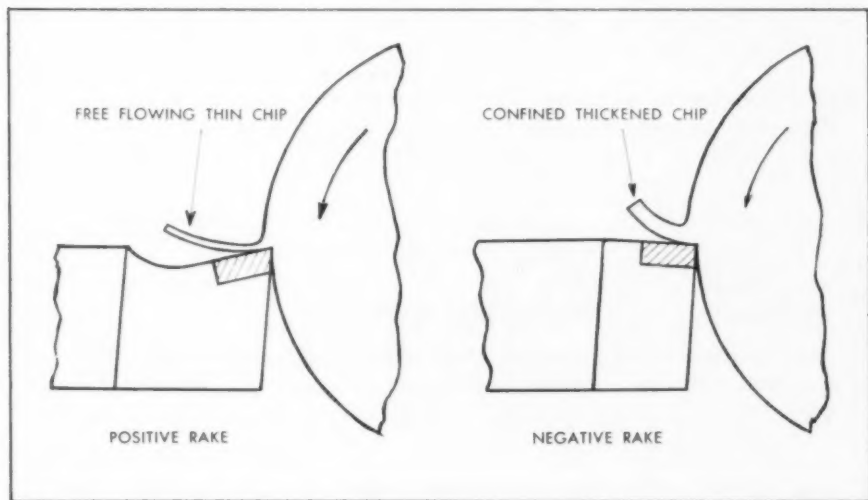
For instance, in designing a cutting tool of high speed steel, a comparatively strong material, the compromise is moderate in that quite high rakes can be used, often on the order of 30° positive. To perform the same operation

with tungsten carbide, the rake used must veer farther away from ideal, to perhaps  $6^\circ$  positive or in some cases even to  $5^\circ$  negative. The adverse effect on chip formation is shown graphically, Fig. 1. Positive rake tools separate a chip by shear while negative rakes break chips off after compressing the material to be cut back toward the work piece.

Most other design considerations applied to tungsten carbide tools are as much a compromise with ideal geometry as is the case with rake—all of which brings us to that feature of design having to do with honing of the edge. To repeat, a keen edge produces the cleanest cut with least power consumption. Honing of the edge is a deliberate dulling and will result in an increase in power consumption and generation of heat at the

point of contact. As heat and abrasion are two of the prime factors contributing to tool failure, a honed edge will wear beyond acceptable limits sooner than will an edge which has not been honed.

Then why do we ever hone the edge of a carbide tool? The answer reverts to the compromise mentioned previously to which we sometimes must resort to protect the comparatively weak tool point subjected to the cutting forces. The edge of the tool is further weakened by the quality of the grinding performed on the carbide. The intersection of two surfaces, each containing grinding grooves, however shallow, forms a corner with a saw toothed or serrated condition. This condition further weakens the corner. The degree of serration of the edge, of course, is a function of the quality of



1. Consideration of the strength of cutting tool materials precludes the possibility of using ideal theoretical tool geometries. For high-speed-steel, the compromise is moderate; high rake angles can be used, often on the order of  $30^\circ$  positive. To perform the same operation with tungsten carbide, the rake must veer farther away from ideal, in some cases to  $5^\circ$  negative.

Edge	Cutting Time	Horsepower		Wear Land	
		Start	Finish	Side	Corner
Not Honed	5 Minutes	19	23.5	.005"	.015"
Honed	5 Minutes	21	28	.007"	.040"
Not Honed	3 Minutes	19	20.5	.003"	.012"
Honed	3 Minutes	20	22.5	.005"	.023"

2. Test data compiled during one test to show the benefits and the drawbacks resulting from the use of honed edges. See text for conclusions.

the grinding. Honing to remove the saw toothed effect does, however, definitely strengthen the cutting edge. This strengthening is of definite benefit in increasing the resistance of the edge to chipping. This benefit is important in abusive operations where there is a pronounced tendency toward edge chipping.

Tests can easily be conducted to show the benefits and the drawbacks resulting from the use of honed edges. The following results, Fig. 2, of one such test illustrate the type of data which can be established.

### One Test Proves a Point

Precision ground triangular disposable inserts in a general purpose

steel cutting grade were used. The honed edges were rounded off to approximately .004" radius.

The material cut was a 10" diameter bar, AISI 4140, 285 BHN, and cutting was done at a speed of 325 sfpm with a feed of .020 ipr.

There was some evidence of chipping on the edge at the depth of cut line and outside the cut, more pronounced on the unhoned inserts, indicating that honing on the sides only would have been beneficial. It is also apparent that honing on the corner would have materially contributed to premature tool failure because of accelerated wear land development on the nose, loss of size control on the work and poor work finish. • • •

Type of Cut	Edge Condition
Light Finish Cuts—Most Materials General Machining on Cast Iron General Machining on Low Strength Non-Ferrous Materials	Not Honed
Non-Interrupted Cuts on Scaled Surfaces but where the Nose of the Tool is Buried in the Cut	Honed Along the Edge Only
Interrupted Cuts on Steel, High Strength Non-Ferrous Materials and High Strength Cast Irons	Honed Along the Edge and Around the Nose Radius
High Strength, Work Hardening High Temperature Alloys	Light Honing (.001"/.002" Edge and Radius)

3. General recommendations on when and how to hone the edges of carbide cutting inserts.



## NUMERICAL CONTROL FOR THE MACHINE SHOP

By J. J. Childs

# Numerical Control and PERSONNEL REQUIREMENTS

■ Unquestionably, a good deal of the trepidation over adopting numerical control stems from the uncertainty as to whether the requirements are within the capabilities of present indirect and direct personnel staffs. In order that the concept grow and benefit the greatest number of machine tool users, a concerted effort has been made to reduce technical training requirements, extending from the design engineering effort on through to the machine operating level.

Likewise, the involved training in maintenance necessary for the earlier utilization of numerical control programming, particularly for the continuous-path type, has now been considerably abbreviated. It would be reasonably safe to assert that, with proper general direction, the majority of companies already possess the necessary talent to efficiently operate a numerical control installation. While a certain amount of orientation and special instruction is necessary, the time required is usually far less than

ENGINEERING DESIGNER

Expressing original design in NC language is helpful. Requires conversion of drafting technique to simpler language.



METHODS ANALYST

Selects parts most suitable for NC and describes portions of part to be machined by NC together with other conventional operations on part.



the normal delivery time of most equipment.

To present a comprehensive review of personnel requirements, the categories that follow describe the normal functions generally necessary for implementing numerical control in a machine shop.

**METHODS ANALYSIS.** One of the purposes of this function is to select parts for specific machining operations as well as describing operations for certain parts. A reasonable understanding of the operation and limitations of numerical control equipment is therefore necessary.

The distinction between the "methods" function and part programming is that the methods analyst must be acquainted with the over-all shop capability in order to evaluate and de-

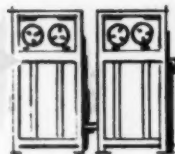
scribe those portions of a part most suitable for numerical control machining, while the part programmer is concerned with detailing the specific requirements necessary for preparing the manuscript information which is to be incorporated directly in a tape or fed into a computer.

**PART PROGRAMMING.** This area, which is concerned with the detailed information required for preparing the tape, is probably the most novel and requires special training. Point-to-point programming is relatively simple and can be learned in a few hours and mastered within a few weeks. Programming for continuous-path machining is considerably more complex; however, computer developments such as the APT program have generally reduced mathematical re-



#### PART PROGRAMMER

Prepares detail manuscript describing exact motions and machining functions. Tool designers with machining experience have been found to be the best candidates for the operation.



#### COMPUTER

Complex programs have already been calculated by mathematicians.

#### TYPEWRITER OPERATOR

Tapes can be punched directly on a standard keyboard "Flexewriter."



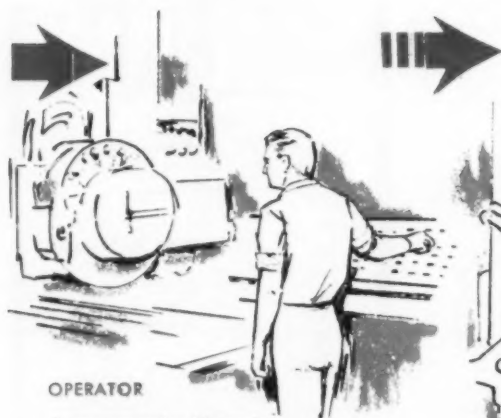
quirements to the high school graduate level. The task of calculating the complex computer mathematics has been accomplished for most applications, and part programming requirements seldom extend beyond a knowledge of elementary trigonometry.

These last comments are in no way meant to derogate this function. A capable programmer will serve countless hours of unnecessary machining and programming time through the proper selection of cutting sequences and the maximum utilization of the latest available part programming techniques.

**DESIGN ENGINEERING.** Most companies now using numerical control equipment have not made the full transition of describing blueprint information in numerical control co-

ordinate language. It is therefore often necessary for the part programmer to convert conventional format to the necessary coordinate language to prepare the detailed manuscript which, in turn, is used for preparing the tape or is fed to a computer.

The task of converting present drafting techniques to a coordinate language system is relatively simple and numerical control consideration at the engineering level will, in most instances, reduce the engineering drafting time required for the preparation of blueprints. Indeed, maximum savings are anticipated when engineering departments are designing in numerical control language, especially if a computer is utilized. The conversion of engineers to numerical control drafting techniques need cause little con-

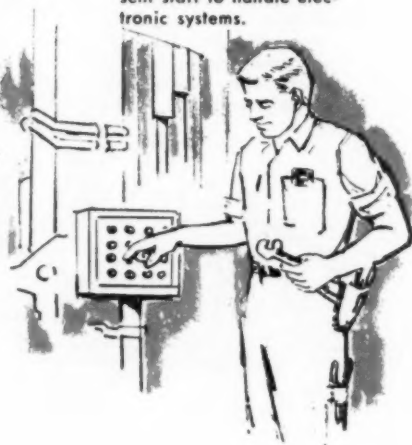


OPERATOR

Less apprenticeship training required; however, usually handles higher valued equipment.

# MAINTENANCE MAN

Modular construction and solid state circuitry, together with special training courses enable present staff to handle electronic systems.



cern since the skills are well within the technical grasp of these people.

**SHOP OPERATION.** Past requirements for machine tool operators no longer hold, and today's numerical control machine operator need not possess the experience of his predecessors. Although lengthy apprenticeship training is no longer a necessity since most technical requirements are performed by the engineering and part programming personnel, operators are expected to know something of programming techniques—in addition to handling more highly valued equipment (which may account for comparable pay standards in some instances).

**MAINTENANCE.** While it is generally realized that proper part programming will assure the most effective utilization of numerically con-

trolled machine tools, proper maintenance is imperative. One of the most common misconceptions about numerical control is that an electronic engineer or "exceptional" technician is essential for maintaining the equipment. This notion was untrue even five years ago when systems were relatively far more complex.

Most companies have found that their electrical maintenance technicians have some electronic experience, and aided by background courses offered by the system builders, are usually well able to service the equipment. The machine tools themselves are complex, but special schools and on-the-job training offered by the machine tool builders as well as electronics systems builders will provide adequate orientation of the mechanical maintenance personnel. • • •

# Machine and Tool BLUE BOOK CUMULATIVE INDEX



JANUARY 1961 to DECEMBER 1961

	Month	Page
<b>Assembling</b>		
Why We Take The Practical Approach		
When Justifying Assembly Machines .....	Mar.	115
Where Will The Robots Be Used? .....	May	108
<b>Bending</b>		
A Case For Improving Both Product Design		
and Manufacturing Methods .....	Jan.	106
Nomographs for Tube-Bending Mandrels ....	Dec.	109
<b>Brazing</b>		
The Real Story Behind Successful Brazing		
Of Carbide Cutting Tools .....	Jan.	112
How To Fasten Carbide to Steel—Part 5.....	Nov.	125
<b>Carbides</b>		
The Real Story Behind Successful Brazing		
Of Carbide Cutting Tools .....	Jan.	112
Machining Time Down, Quality Up With		
Special Carbide Grade .....	Mar.	131
How to Fasten Carbide to Steel—Part 1 ....	July	115
How to Fasten Carbide to Steel—Part 2 ....	Aug.	118
How to Fasten Carbide to Steel—Part 3 ....	Sept.	131
How to Fasten Carbide to Steel—Part 4 ....	Oct.	137
How to Fasten Carbide to Steel—Part 5 ....	Nov.	125
Between Carbide and Ceramic .....	Oct.	141
<b>Castings</b>		
Casting Process Lowers Cost of Titanium		
Parts .....	May	129
How To Buy Die Castings .....	Sept.	135
<b>Chipless Machining</b>		
Minuteman Case "Stretched" On Giant		
Floturn .....	Mar.	128
Temco Finds Shear Forming Best For		
Shaping Nose Cones .....	Mar.	134
<b>Chipless Machining (columnist)</b>		
Three Good Reasons For Investigating This		
Important Area of Metalworking .....	Apr.	128
Internal Swaging Performs A Wide Variety		
Of Jobs .....	May	121
Pneumatic-Mechanical Processes .....	June	149
Explosive Forming Processes .....	July	121
High-Energy-Spark Forming .....	Aug.	127
Electromagnetic Forming .....	Sept.	139
<b>Chucks</b>		
Ball Joints Take Hold In High-Production		
Chucking .....	Sept.	124

# CUMULATIVE INDEX

<b>Cutting Tools</b>	What Happens When Cutting Edges Dull? ...Jan.	88
	Hold-Down Plate In Milling Cutter Speeds Profiling .....Feb.	99
	Now Finish Milling With Throwaways .....Apr.	135
	New Finishing Technique Improves an Established Tool's Performance .....June	123
	4 Spindles On A Single Spindle Lathe! .....June	155
<b>Cutting Tools (columnist)</b>	The ABC's Of Speeds and Feeds—Part 1 ....Jan.	79
	The ABC's Of Speeds and Feeds—Part 2 ....Feb.	103
	The ABC's Of Speeds and Feeds—Part 3 ....Mar.	125
	Now Finish Milling With Throwaways .....Apr.	135
	What Do You Get When You Buy A Cutting Tool? .....May	119
	Which Milling Cutter? Carbide vs. High-Speed Steel .....June	141
	Applying the New Adjustable Cartridge Units .....July	139
	Between Carbide and Ceramic .....Oct.	141
	Tungsten Can Be Machined .....Nov.	137
	The Case for Honing Carbide Cutting Tools ..Dec.	120
<b>Dies</b>	Watch That Burr! It Can Eat Up Profits On A Long Stamping Run .....Feb.	80
	Laminated Plastics Cut Short-Run Die Costs..June	120
	This Tooling Permits Deep Box Forming on a Press Brake .....June	146
<b>Diemaker (columnist)</b>	Inspecting the Finished Die .....Jan.	85
	You Can't Assume The Obvious Where Workmanship Is Concerned .....Feb.	106
	More Teamwork Needed Before Production Starts .....Mar.	118
	Check Your Attitude Toward Maintenance ..Apr.	131
	Why Not Leave Some of the Die Designing Up To The Diemaker? .....May	125
	Don't Let Slugs Cling to Punches .....June	143
	Tips on Tooling for Long-Run Production ..July	130
	Know Your Costs for Profitable Operations ..Aug.	131
	Stop Wasting Hard-Won Experience .....Sept.	146
<b>Electro-Discharge Machining</b>	Critical Threads Cut by E D M .....Nov.	122
<b>Engineering and Tooling (columnist)</b>	Get Your Money Off Your Shelf .....Jan.	73

# JANUARY 1961 to DECEMBER 1961

<b>Expositions</b>	Preview of the A.S.T.M.E. Tool Exposition ..May	161
	Seventh European Machine Tool Exposition ..Nov.	116
<b>Finishing</b>	The Real Reason For Superfinishing .....Mar.	102
	New Finishing Technique Improves an Established Tool's Performance .....June	123
<b>Grinding</b>	Grinding Wheel Loading Minimized By Ultrasonics .....Aug.	116
	Diamond Wheels For Grinding High- Vanadium Steel? .....Oct.	115
<b>Industrial Economics</b>	Get Your Money Off Your Shelf .....Jan.	73
	Watch That Burr! It Can Eat Up Your Profits On A Long Stamping Run .....Feb.	80
	Why We Take The Practical Approach When Justifying Assembly Machines .....Mar.	115
<b>Industrial Management</b>	The Written Word Can Get Action .....Jan.	94
	A Case For Improving Both Product Design and Manufacturing Methods .....Jan.	106
	Have Time And Indecision Saddled You With Misfits? .....Feb.	88
	Standard Time Data—for "Guess-Less" Estimating—Part 1 .....July	100
	Standard Time Data—for "Guess-Less" Estimating—Part 2 .....Aug.	106
	For Rapid Retrieval . . . Card Mount Microfilmed Drawings .....Oct.	128
	Volkswagenwerk Revisited .....Aug.	92
	Blue Book Visits Renault .....Nov.	108
<b>Inspection</b>	Inspecting the Finished Die .....Jan.	85
	What Happens When Cutting Edges Dull? ...Jan.	88
	You Can't Assume The Obvious Where Workmanship Is Concerned .....Feb.	106
	Calibrating Precision Gage Blocks .....Apr.	110
	Laboratory Instrument Joins the Production Line .....June	156
	And Now, 5-Axis Tape-Controlled Inspection. Aug.	102
	Electronic Gaging—Polar Tracing Control Bearing Race Production .....Aug.	125
<b>Interviews</b>	John Dykstra, President, Ford Motor Co. ....Mar.	94
	Henry Viscardi, Jr., President, Abilities, Inc. ....Apr.	102
	Jack Kleinoder, General Manager, Volkert Stampings .....May	94
	Otto Hoehne, Production Director, Volkswagenwerk .....Aug.	92

# CUMULATIVE INDEX

	George Spatta, President, Clark Equipment Company .....	Sept.	110
	Harold A. Wallace, Vice President, Massey-Ferguson .....	Oct.	110
<b>Interesting Motions</b>	Transmitting Intermittent Rotation .....	Feb.	100
	Increasing a Press's Capacity .....	Apr.	126
	High-Ratio Speed Reducer for Controlling Spacing .....	June	152
	Cam Operates Two Levers—In Different Sequences .....	July	118
	Reversing Rotation Operates Ratchet in One Direction .....	Aug.	115
	Gear and Eccentric Increase Travel of Slide .....	Sept.	128
	Variable-Rise Cam Operates Two Levers .....	Oct.	130
	Putting a Pause in a Gear Drive .....	Nov.	140
	One Slide Operates Two Others .....	Dec.	118
<b>Jigs &amp; Fixtures</b>	Proper Locating Joints Assure Uniformity of Parts .....	Mar.	108
	Getting The Most From Jigs With the Right Bushings .....	Oct.	124
<b>Lubrication</b>	How Timken Handles Lubricants .....	Mar.	112
<b>Lubricants &amp; Coolants (columnist)</b>	Lubricants and the Machine Tool .....	Oct.	135
	How Sulfur Added to Oil Led to Improved Coolants .....	Nov.	135
	Many Methods of Applying Lubricants .....	Dec.	113
<b>Machine Tools</b>	Dual Facing Job on Transmission Cases Handled Automatically by Unusual Method .....	Mar.	132
	Fabricating In Titanium? Cut Costs By Sawing Contoured Parts from Slabs .....	May	100
	New Can Making Line in Philippines Boosts Economy .....	May	130
	Productivity Increased by Four Chuckers Grouped in a Square .....	June	127
	Tracing Ain't Dead Yet! .....	Oct.	120
	Lubricants and the Machine Tool .....	Oct.	135
	Blue Book Visits Renault .....	Nov.	108
	Seventh European Machine Tool Exhibition .....	Nov.	116
<b>Machine Tools (columnist)</b>	The Importance of Climb Milling .....	Jan.	81
	Improper Mounting of Cutters Can Cancel Machine's Precision .....	Mar.	121
<b>Machining</b>	The ABC's Of Speeds and Feeds .....	Jan.	79
	The Importance Of Climb Milling .....	Jan.	81

# JANUARY 1961 to DECEMBER 1961

	Improper Mounting of Cutters Can Cancel Machine's Precision .....	Mar.	121
	What's So Different About High Speed Machining? .....	June	112
	A Pioneer User Reports on Ultrasonic Machining .....	June	116
	Small "Doodle Bug" Tool Handles Big Milling Problem .....	Nov.	119
	Critical Threads Cut By E D M .....	Nov.	122
	Here's One Way to Machine Unwieldy Work .....	Dec.	106
<b>Materials</b>	Chromium Blanket Protects Missile Probe ...	May	106
	Aluminum Addition, Less Sulphur, Improve Machinability of New 303 Stainless .....	May	115
	Quality Steel . . . from the Open Hearth ...	July	126
<b>Materials Handling</b>	Where Will The Robots Be Used? .....	May	108
	Escalators Solve Chip-Disposal Problem ....	June	137
<b>Numerical Control</b>	There's No Need to Postpone Numerical Control .....	Apr.	118
	Tapes Make Debut at Steel Fabricator's .....	Apr.	141
	Use Numerically Controlled Machines? Speed Machine Setup with One Reference Point..	July	124
	And Now, 5-Axis Tape-Controlled Inspection .....	Aug.	102
	English-Like Language Directs Tape Producing Computer .....	Aug.	130
<b>Numerical Control for the Machine Shop (columnist)</b>	How Air Force Requirements Blazed the Path to N. C. ....	May	90
	Point-to-Point Positioning .....	June	131
	Continuous-Path Contouring .....	July	133
	The Controlling Medium—Punched Tape ...	Aug.	137
	APT—Major Breakthrough in Programming..	Sept.	141
	Will Numerical Control Save You Money? ...	Oct.	132
	Maintenance Must Be Planned, Too! .....	Nov.	132
	Numerical Control and Personnel Requirements .....	Dec.	123
<b>Plastic Tooling</b>	Laminated Plastics Cut Short-Run Die Costs..	June	120
<b>Presses</b>	A Case For Dual Valves To Prevent Punch Press Repeats .....	Feb.	94
	Increasing a Press's Capacity .....	Apr.	126
	Light Poles Made on Twin Press Brakes ....	Apr.	140
	Where Will The Robots Be Used? .....	May	108



# CUMULATIVE INDEX

	Understanding the Four-Slide Process— Part 1 .....	June	102
	Understanding the Four-Slide Process— Part 2 .....	Sept.	116
	Laminated Plastics Cut Short-Run Die Costs ..	June	120
	This Tooling Permits Deep Box Forming on a Press Brake .....	June	146
	U. S. Updates Japan's Industry .....	Nov.	130
<b>Quality Control</b>	Gaging System Reduces Rejects, Saves Time ..	Jan.	124
	Laboratory Instrument Joins the Production Line .....	June	156
	And Now, 5-Axis Tape-Controlled Inspection .....	Aug.	102
	Electronic Gaging—Polar Tracing Control Bearing Race Production .....	Aug.	125
<b>Sawing</b>	Fabricating in Titanium? Cut Costs By Sawing Contoured Parts From Slabs .....	May	100
	New Finishing Technique Improves an Established Tool's Performance .....	June	123
	Giant Saw Increases Productivity at Kaiser ..	June	158
<b>Threading</b>	Thread Rolling Combined With Tracer Turning .....	Apr.	142
	Critical Threads Cut by E D M .....	Nov.	122
<b>Time Study</b>	Productivity Increased by Four Chuckers Grouped In a Square .....	June	127
	Standard Time Data—for "Guess-Less" Estimating—Part 1 .....	July	100
	Standard Time Data—for "Guess-Less" Estimating—Part 2 .....	Aug.	106
<b>Tracer Control</b>	Tracing Ain't Dead Yet! .....	Oct.	120
<b>Ultrasonic Cleaning</b>	Ultrasonic Cleaning—Answer to Bearing Reliability .....	Feb.	109
	Grinding Wheel Loading Minimized by Ultrasonics .....	Aug.	116
<b>Ultrasonic Machining</b>	A Pioneer User Reports On Ultrasonic Machining .....	June	116
<b>Welding</b>	Low Cost, Simplified Sandwich Panels Are Easily Formed .....	May	132
	Diesels Sport New Jackets .....	Dec.	92
	Innershield Squirt Welding Doubles Production .....	Dec.	100

# Shop Hints **B**

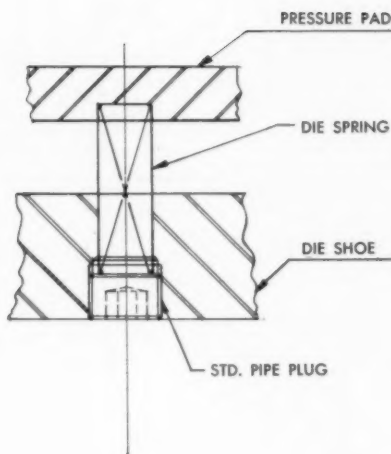


FIGURE 1

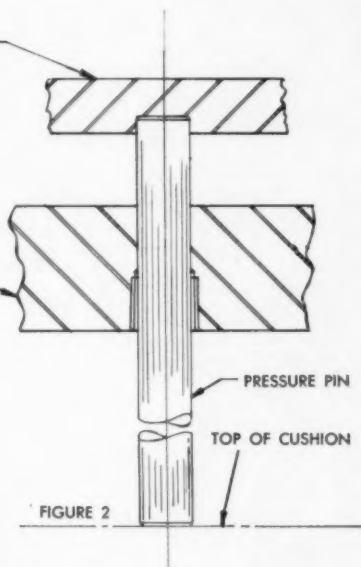


FIGURE 2

## PIPE PLUGS INCREASE DIE VERSATILITY

By Roger Isetts

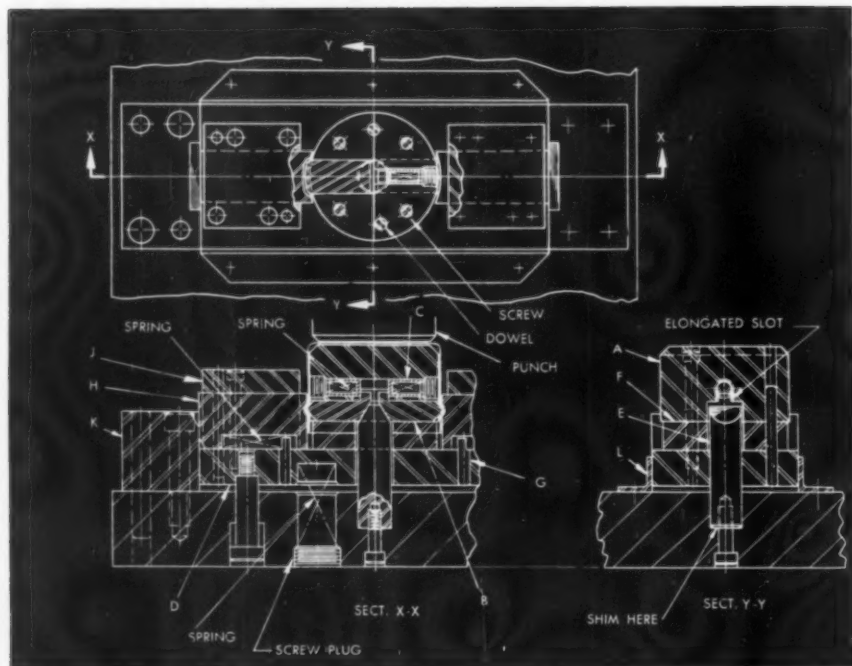
■ It is often better to run dies that require a spring-loaded pressure pad on a press equipped with an air cushion. This is especially true on heavy deep forming or drawing operations because more pressure can be obtained. However, in most plants only a few presses will be found to have air cushions.

Installing a pipe plug can greatly increase the versatility of such dies and allow them to be run on a variety of presses either with or without cushions. Shown in Fig. 1 is a die adaptation for running on a cushionless press. The spring pockets in the

die shoe, instead of being counter-bored, are drilled all the way through. Holes are drilled and tapped from the bottom side of the shoe to receive ordinary countersunk pipe plugs which serve to back up the springs. If the spring holes are, for example,  $\frac{3}{4}$ " in diameter, a  $\frac{3}{4}$ " N.P.T. works fine. If they are 1" diameter, a 1" N.P.T. will do, and so on.

In Fig. 2 is shown the same die running on a press equipped with a cushion. The pipe plugs are merely removed and pressure pins inserted in the spring holes.

• • •



## EMBOSSING DIE FOR ALUMINUM CUPS

By Frank Murray

■ The die illustrated was designed for embossing 3" O.D. aluminum cups made from .040" stock. The two embossings are .045" deep and 7/16" long. Parts are loaded on a spring-pad-mounted locator. As the punch descends, outer form blocks are cammed into position and held there. Continued movement of the punch cams inner form blocks outward and produces the embossings.

Locator A has a slip fit slot for inner form blocks B ground centrally through its bottom surface. It also

has a slip fit hole provided for spring pins C. The ends of the hole are tapped for set screws. An elongated slot is milled at the center to clear the lugs on B. Screws and dowels mount the locator to pad D.

Form blocks B have a 30° cam surface matching that on cam pin E. The cam pin is mounted in the die shoe by a socket head screw, and is adjusted by shimming. Spacer F acts as a bearing for the bottom surface of blocks B.

Pad D is provided with spring

pockets, and is retained and guided by stripper bolts. Two flattened spring pins **G** are assembled in it as shown.

The outer form blocks **H** slide in a channel-shaped housing **J**, attached to the pad, and are returned to the loading position by springs. These blocks also are provided with a 30° cam surface, and have a spring pocket milled in their base.

Backing blocks **K**, have a 30° cam surface matching that on **H**, and are doweled and bolted to the die shoe. Stop blocks (not shown) control the depth of embossing. A dirt guard, made from angle iron mounted on the die shoe, completes the assembly. Suitable press guards are used when running the tool. • • •

## HOW BORING-BAR CUTTER LOCATION REFLECTS TURRET ERROR

By M. W. Loftus

■ Errors in the indexing of the turret will cause holes to be bored oversize

if the cutter is not placed vertically in the boring-bar. The exaggerated

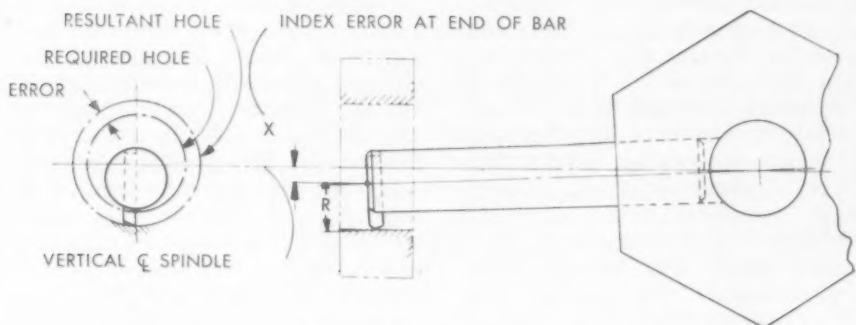
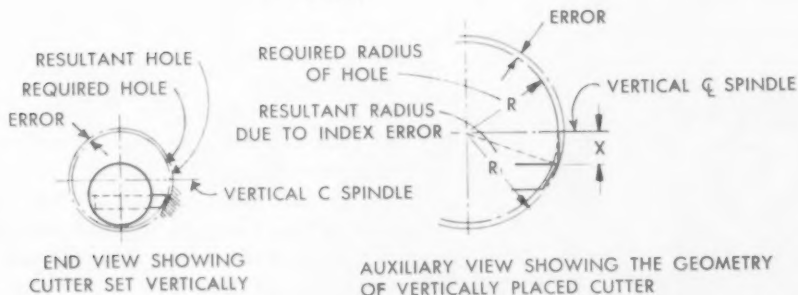


FIGURE 1



$$R_1 = \sqrt{R^2 - X^2}$$

FIGURE 2

plan and end views, Fig. 1, show what happens when the cutter is located horizontally. An error  $X$  in indexing as small as 1 minute will displace a cutter .003" at a point 10" from the center of the turret, and results in a hole being bored .006" oversize.

When the cutter is located vertically, as shown in the smaller end view, Fig. 2, errors in indexing will have little effect on the hole size. A cutter set 2.000" (for a 4.000" diameter hole)

from the center of the bar—assuming the same index error as above—will theoretically produce a hole that is less than .0001" oversize. In the auxiliary view, Fig. 2, the resulting hole radius for vertically placed cutters will be the hypotenuse of the triangle whose sides are the required radius  $R$  and the index error  $X$ . As  $X$  will always be small in relation to  $R$ , the hypotenuse  $R$  will be very nearly the same as  $R$ . • • •

## CROOKED SLIDES ROB LATHES OF ACCURACY

■ New techniques of improving standard production tracer lathes to meet space age accuracy requirements have been developed by the University of California's Lawrence Radiation Laboratory, Livermore, Calif. The work began several years ago when Atomic Energy Commission design engineers began specifying closer machining tolerances than could be obtained from standard tracer lathes. By applying the new techniques, the average LRL tracer lathe accuracy was improved from 0.004" to 0.0003".



Before corrective rework is done on a lathe, a series of six checks are performed to isolate and measure the different sources of machining error. The data from these checks is analyzed and correlated with the error of a finished part. The correlation of error data shows what part of the lathe needs reworking and what non-lathe errors are present. To everyone's surprise, including the lathe manufacturers, the largest single source of error in a typical lathe comes from crooked slides.

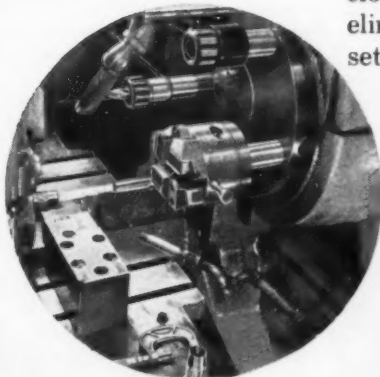
The straightness of a slide is measured with an auto-collimator. This is an optical device that can read changes in angular orientation as small as 1/10 of one second of arc. The analysis of slide error shows that an out-of-straightness of only 20 micro inches can produce a tool error of 1000 micro inches, depending on the relationship of the template carrier to the spindle. The effect of slide error can be minimized by placing the template carrier at the spindle axis level and as close to the spindle as is practicable. • • •

**LANDIS  
CHASERS  
last 6  
times longer  
than  
form  
tool**

A Landis 1¼" FD LANDMATIC Die Head is shown threading nipples at Pershing Machine Co., Jackson, Mich. Chaser life is 6 times longer than that of the form tools used.

The Head is mounted on a 2½" AB Cleveland Dialmatic Machine and produces 1¼" diameter, 18 pitch NEF, Class 2 threads 1" long on Monel metal. The form tools produce only 15 pieces between grinds and the drills, also used, produce 100 pieces. Besides having a longer chaser life, the LANDMATIC Head produces 100 pieces between grinds equalling the drill life. It also produces excellent thread finish and size control.

The heat-treated, self-opening, manually-closed Standard F LANDMATIC is designed for application to turret lathes, hand screw and automatic screw machines, chucking machines and other equipment using a nonrotating type tool. When the tool is to be placed on automatic equipment where automatic closing is required, the FD LANDMATIC, incorporating overtravel, is recommended. It can be cam-closed through special closing pins or bushings. This overtravel feature eliminates the need for a complicated, accurately-set closing cam. Ask for Bulletin F-90.



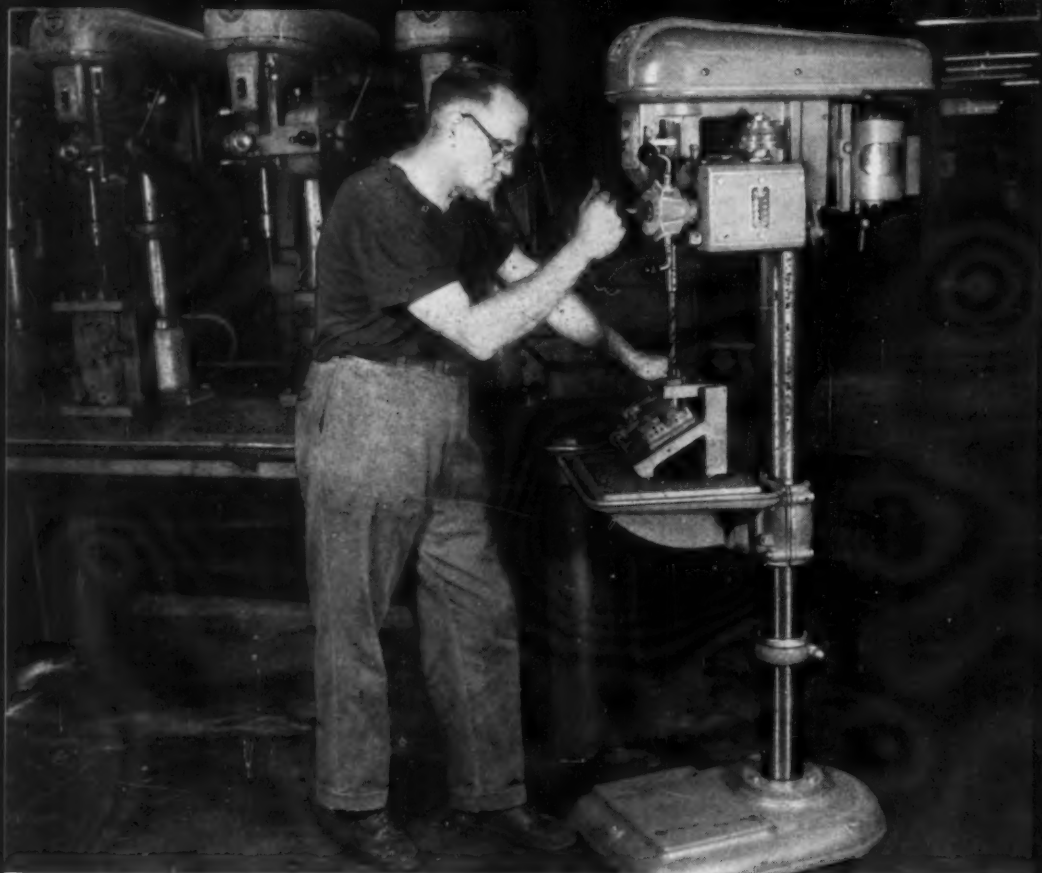
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**ALL NEW Capacity**—Equipped with exclusive Rockwell Power Feed these drill presses handle many production jobs ordinarily done by costly, fixed equipment.

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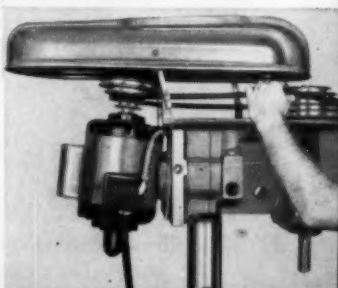
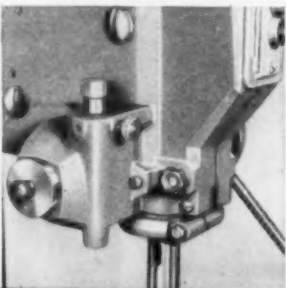
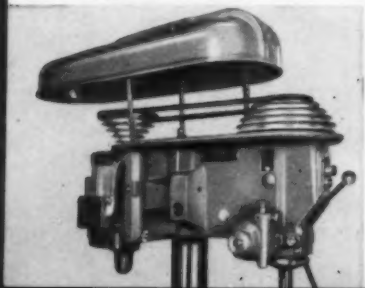
—Tilts up and back out of the way giving operator plenty of room to make belt and speed changes quickly, easily. Three specially designed supports and a stop hold steel guard in "up" position, built-in clips automatically lock guard in operating position when closed.

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—A new concept in depth stops that eliminates bottom-of-stroke quill deflection which causes excessive drill breakage. Convenient adjustment knob permits fast, one hand operation, locks in position to stop pinion shaft at same depth through repeated cycles.

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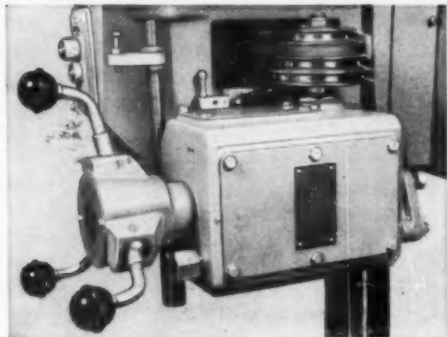
Here is a major engineering advance from Delta to give you more drilling accuracy, job flexibility and operating economy. You can choose the machine best suited to your needs from 76 models in a complete line of 17" drill presses that incorporate the most up-to-date performance features.

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**FREE BROCHURE**—Complete specifications and details on the full line of all new 17" drill presses and accessories. Simply write: Rockwell Manufacturing Co., Delta Power Tool Division, 610A N. Lexington Ave., Pittsburgh 8, Pa.



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SINGLE POINT THREADING

Costs

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FOB Factory  
Complete with all  
standard equipment

This is an all new 1½" bar capacity ram type turret lathe with power feeds to all 8 working stations . . . that in addition to bar and collet work also has the versatility to do chucking, and when needed, single point threading. Powered by a 5 h.p., two-speed, geared motor, the new Sheldon 3 R turret lathe provides 16 spindle speeds, 60 different feeds to the carriage and cross-slide, and 180 different feeds to the ram turret.

The turret itself is ruggedly built and accurately machined to provide close tolerance indexing. And for complete ease of operation, it is put under power by simply pressing a push button on the control panel.

This new 3 R Sheldon is completely equipped with two-speed motor and electrical controls, coolant system and splash guards, LO spindle nose, large satin chrome dials and hardened bed ways. It also provides an additional cost saving feature—each turret face is drilled and tapped for your standard flange type tooling as well as being bored for your standard 1½" shank type tooling.

For versatile, accurate machining in either long or short runs, the new Sheldon 3 R provides the answer to low investment cost with high profit operation.



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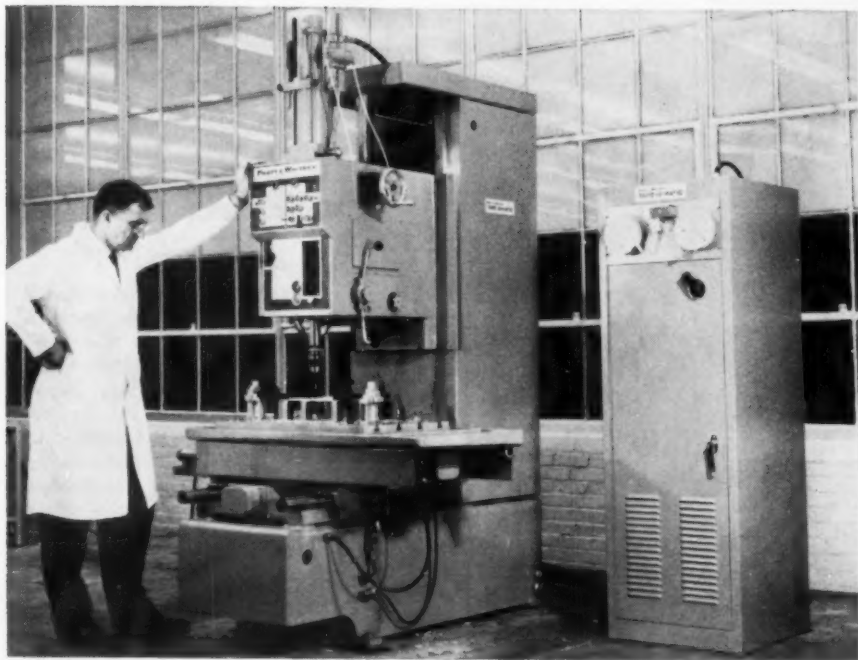
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# BB

## What's New in Metalworking



### Numerically-Controlled Drill to be Mass Produced

Pratt & Whitney Co. is mass producing a single-spindle, numerically-controlled drill to bring the price of the drill, positioning table and control system below \$9,000. Called the "Tape-O-Matic" drill, it has many optional features and accessories to meet requirements of a variety of machining jobs. (The machine shown above is equipped with a "Repeat-Cycle Air-Feed Cylinder Attachment" that is mounted above the spindle head.) Be-

cause there are many non-cutting operations that require precision positioning, the bottom half of the machine and control system will be available separately.

The positioning table's working surface is 30" by 20"; its travel is 20" by 15". Maximum distance, work table to spindle nose is 24½". A 1½ hp motor drives the spindle at infinitely variable speeds ranging from 150 to 2000 rpm.

(Continued)

(Continued from page 141)



ABOVE—View of inside (front) of Tape-O-Matic numerical control cabinet.

ABOVE RIGHT—Rear view showing logic circuitry. Operator is holding one of four varieties of printed circuit cards. Nearly 200 such cards are used.

#### **Tape-O-Matic Control System**

The controls, and the machine itself, form a closed loop servo system. Dimensional information to the machine can be positive or negative, since the machine has a "floating zero" which allows it to operate in all four quadrants and enables the operator to set up and zero his workpiece anywhere within the limits of the table's working surface. Position of the slides is commanded by information on standard E. I. A. 1" wide, 8 channel, perforated tape.

Logic circuitry is composed of transistorized, plug-in, printed circuit boards arranged in a NOR configuration. This design offers maximum reliability because there are no moving parts. Basically, only four varieties of circuit boards are used in the logic circuit, greatly minimizing trouble shooting and parts inventory.

Position locating accuracy is said to be  $\pm (.0005 + .0001 d)$ , where  $d$  is equal to the distance in inches. Repeatability is  $\pm .0005"$ .

Pratt & Whitney Co., Inc., West Hartford 1, Conn.

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## Could You Trace-Turn this Part in One Continuous Pass?

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Taper  
".0" Ring Groove  
".0" Ring Groove  
Trace-Turn O.D.  
Taper  
Trace-Turn O.D.  
Square Shoulder  
".0" Ring Groove  
".0" Ring Groove



Flat  
Template

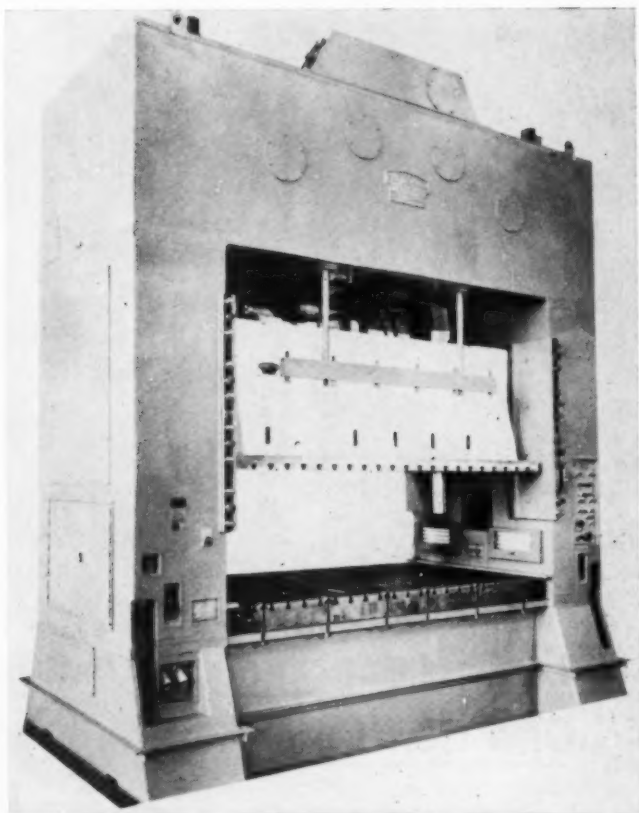
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### **400-Ton Eccentric Press For Automotive Stampings**

A 400-ton two-point eccentric press has been designed to produce a wide variety of automotive stampings. It features advanced styling and reduced maintenance through the use of welded steel plate construction. With its full eccentric drive employing no crankshaft, it delivers greater torque and maintains great production accuracy due to its box-type slide and barrel-type slide adjustment. Slides are air-counterbalanced.

This press has all gears and drive mechanism completely enclosed and is equipped with a drum-type clutch. The press is electrically controlled and air-

operated, having a spring-loaded brake.

The pneumatic cushions in the bed have separate operating controls permitting a greater variety of press operations, including multiple die use for fully automated production.

Operating at a speed of 18 spm, this press has a bed area of 132" x 72" and a 20" stroke of slide with a 10" adjustment. The distance from bed to slide with stroke down and adjustment up is 40".

The Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland 14, Ohio.

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# MERIDIAN METALCRAFT INCREASES PRODUCTION 200 %

With  
Two **BURGMAS**

Bench Model  
Turret Drills



**17,600 HOLES DRILLED, C' SUNK**

**AND TAPPED IN SINGLE JOB**

Meridian Metalcraft, Inc., Whittier, California, uses two power-fed, specially tooled Burgmaster Bench Model Turret Drills to increase production 200 % in the drilling, c'sinking and tapping of 176 holes in a webbed-core dissipator plate . . . 100 plates to a run. A Burgmaster unit is mounted on the frame of an old rivet machine to get added throat depth and speed. Flat sides are machined on this unit. The other Burgmaster unit is equipped with a trunion

mounted fixture for fast indexing of holes machined in opposing edges of the plates. Hole locations are held to .002". The Burgmasters replaced ten single-spindle drills and reduced floor space. Some salient reasons why you should get the facts on the Burgmaster.

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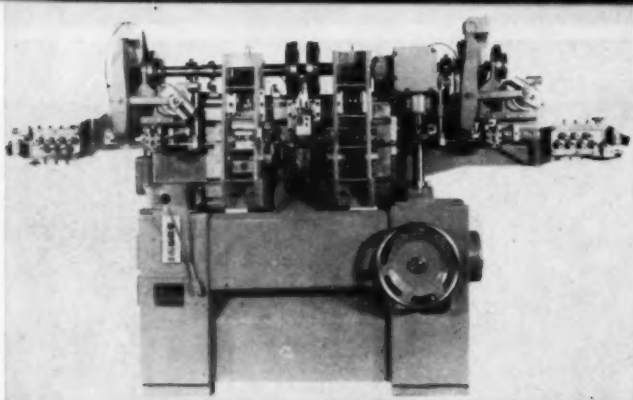
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### Metal Processing Machine

The double-feed V-82 vertical metal-processing machine can separately die-stamp and form two wire or strip pieces and then assemble them, all at output rates up to 200 assemblies per minute. Material capacity of this machine is 2½" maximum strip width, .062" maximum strip thickness, and .207 maximum wire diameter.

Maximum feed length is 12" with either 90° or 180° feed cycles. Maximum

press capacity is 36 tons with two presses on the left-hand side (cut-off removed) and one on the right. Press stroke is 1" and shut height is 6⅝". Strokes of the forming slides are 1⅜" for top and bottom, 2¼" for left and right sides, and ½", 1⅜", 1⅝", and 2⅝" on both the center form and knockout.

Machine Division, The Torrington Mfg. Co., Torrington, Conn.

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## Beverly THROATLESS SHEAR

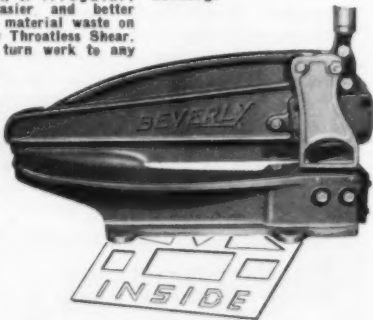
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Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 3 blades assures accuracy, clean cutting action. Cuts 2½"x16" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts.

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BEVERLY SHEAR MFG. CO., INC., 3005 W. 111th ST., Chicago 55, ILL.

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# NEW! **HEAVY DUTY**

## Lead Screw **TAPPER**

**... with capacity and  
power to spare!**

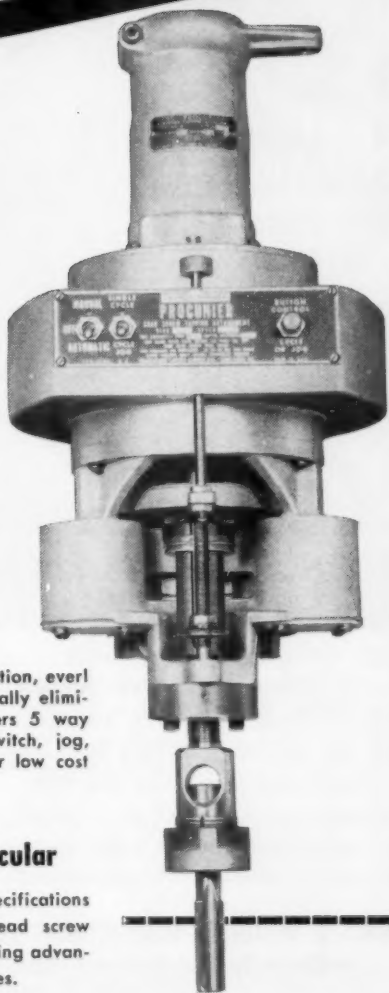
Difficult tapping jobs become routine, tough jobs appear (and are) easy—with the new Procunier heavy duty lead screw tapping unit. Operating with gentle push button ease, it literally "eats up" work—but more important, performs repetitive tapping with "gauge perfect" precision. It's as close to foolproof tapping as you can get. Tap capacity in steel  $\frac{1}{4}$ " to  $\frac{1}{2}$ "; in softer material up to  $\frac{3}{4}$ "; and  $\frac{1}{8}$ ",  $\frac{1}{4}$ " and  $\frac{3}{8}$ " pipe taps.

A unique operating principle guarantees precision every time! Tap is fed into work by its own lead screw without operator pressure. The result is tapping uniformity . . . on every part . . . without variation, ever! Broken taps, parts and stripped threads are practically eliminated. As an added bonus, lead screw unit offers 5 way operating action—push button, foot or fixture switch, jog, single cycle and automatic operation. It's ideal for low cost automation or semi-automatic tapping.



### **Send for FREE Circular**

giving full details and specifications on this remarkable, BIG, lead screw tapping unit. Explains operating advantages, capacities, lists features.



# **PROCUNIER** Safety Chuck Co.

14 S. Clinton St., Dept. 12, Chicago, Ill.

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**MOST  
VERSATILE**  
general purpose  
all-pneumatic  
**MARKING  
MACHINE**



## ROLL-O-MARK

Noblewest ROLL-O-MARK is the world's most versatile general purpose marking machine. It produces sharp, clear, **permanent** indented impressions into metal, wood, plastic and other materials. Model 50P1, shown, has air powered work table and die slide. With Cyclomatic Control will mark up to 1500 pieces per hour. Other models with manual or semi-pneumatic operation. Write for specifications.

**NOBLE & WESTBROOK MANUFACTURING CO.**  
9 Westbrook St., East Hartford 8, Conn.

**\* mark it best with  
NOBLEWEST**  
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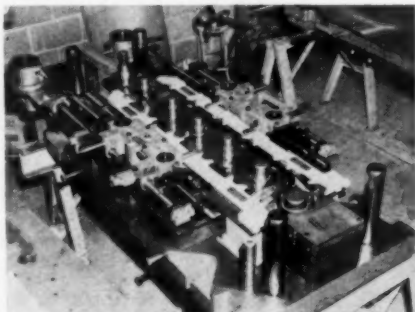
## Transfer Feed Units

An existing gap-type press can be converted into a transfer press giving economic advantages of increasing press capacity, reducing labor costs, and automating existing obsolete equipment.

This particular unit is engineered for a press with a stroke much too short to operate a mechanical ram actuated unit. Therefore, it is necessary to actuate this transfer unit with a single air cylinder which is timed to operate its feed stroke when the ram of press has stopped about top dead center. The in and out movement of finger bar and the transfer of work-piece is mechanically interlocked and actuated through a gear box by a single cylinder. The instant that the fingers are retracted from beneath the punch area, the press is automatically tripped from the downward cycle.

A minimum of electrical controls are needed as only one cylinder is used to operate both sides of the transfer press, regardless of how fast it is in spm or how short the stroke. The stroke only has to be long enough to provide enough clearance for the part to be transferred underneath the punch in the up position. The speed of the fastest press is slowed down automatically by the cycling of the unit to the necessary and desired operating condition.

Livernois Engineering Co., 25200 Trowbridge, Dearborn, Mich.



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Hand cranking eliminated  
by NEW low-cost  
table control



## COVEL 10-P POWER-ASSIST\* HAND FEED 6" x 18" SURFACE GRINDER

Hydraulic power responsive to fingertip touch enables operator to control table speed and direction with effortless ease of automotive power steering. A slight touch of the lever, located in the position of the conventional hand wheel, moves table to left or right. Lever moves in or out to provide speeds from 50 fpm to a slow crawl.

\*Patent Pending

BB-121C

Micro-Precision a Covel Tradition — — Since 1874

# COVEL

**PRECISION  
GRINDERS**

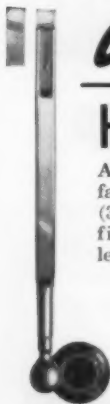
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Hand Feed BULLETIN **121C**



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Supersensitive Anderson Balancing Ways (Stand or Pillow Block Type) will static-balance rotating parts easier, faster, more accurately. No setup, no leveling, no centering. Glass-hard spindles and bearings prevent wear or ball-bearing indentations when balancing heavy work. Superior accuracy lasts throughout long life. Proved and preferred over 40 years.



## Anderson HAND SCRAPERS

Anderson Hand Scrapers are: (1) faster cutting, (2) easier to use, (3) just the right spring, (4) palm fitting grip, (5) 18" - 20" - 22" lengths. Saves costly regrinding.

**\$6.75** (18") with high speed blades

**\$9.85** (18") with carbide-tipped blades

**\$1.75** for rubber bumper shown below



Write for Bulletin 12-5  
**ANDERSON BROS.  
MFG. CO.**

Rockford, Ill.

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### Device Tests Wheel Hardness

An electronic device, called the Dyna-Grader, has been developed by the Macklin Co. for testing the hardness and uniformity of a grinding wheel across its entire cutting face while the wheel is rotating. Test results, electronically recorded on a permanent tape, will provide a guide for wheel manufacturers to improve uniformity. It will help users by improving quality control of their production grinding.

The testing device passes a conical steel cutter across the face of the moving wheel and crushes minute amounts of abrasive from the wheel surface.

Macklin Co., Jackson, Mich.

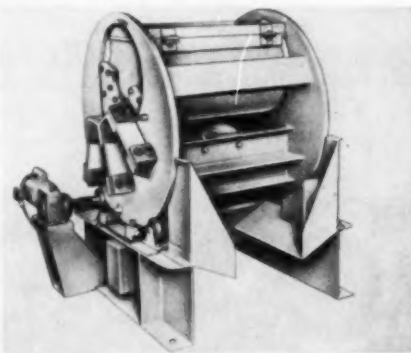
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### Barrel Finishing Machine

A vibratory barrel finishing machine, Model V B-6, has a capacity of 6 cu. ft. It deburrs, deflashes, polishes, or de-scales, and includes a pushbutton feature for rinsing or unloading. It completely finishes parts, rotates to the emptying position, and then the barrel tilts in order to facilitate unloading, all automatically.

The electromagnetic drive produces 3600 vpm. There are no cams, belts, gears, bearings, or other moving parts in the drive to cause troublesome maintenance.

Synton Co., 300 Lexington Ave.,  
Homer City, Pa.



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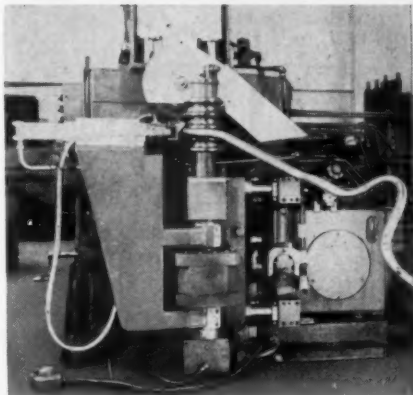
### Tube Bending Machines Have Numerical Controls

Two automatic tube-bending machines apply numerical control to automate the bending of tubing to any required configuration, in large or small quantities, and without need of elaborate tooling.

Called Bend-O-Matic, both utilize punched tape to program the bending of straight tube stock to desired angles and contours, accurately and economically.

One model, the Series 100, was designed for producing the bewildering variety of tailpipes required by different makes and models of cars and trucks.

A similar machine, called the Series 200, is designed for general industrial use. Applications include: complex fuel and hydraulic lines for aircraft, missiles, and similar vehicles; piping for chemical



processes; or other systems or products where bent piping is used.

Baldwin-Lima-Hamilton Corp., Philadelphia 7, Pennsylvania.

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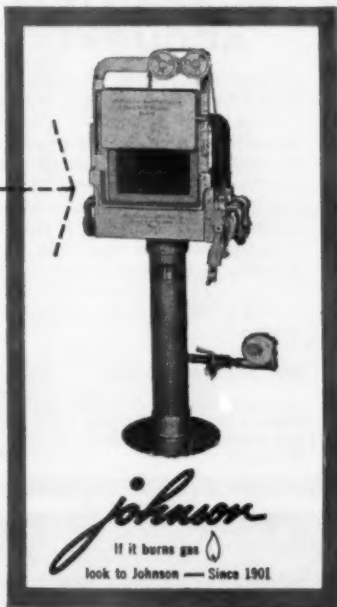
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Description and prices for Clark Hardness Tester and free Hardness Conversion Chart available on request.



Missile-Age Accuracy



CLARK INSTRUMENT, INC.  
10202 FORD ROAD  
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## Form Rolling Machine Has Adjustable Die Holders

A thru-feed thread and form rolling machine has adjustable die holders that remain in the rolling position for continuous thru-feed threading of long or short work. For thru-feed rolling of work with shoulders, a hydraulic system is available for retracting the dies from the rolling position. This permits the work to be returned to the front of the machine for unloading.

This Model A25 can be furnished with a variety of tooling for meeting specific applications, as well as general-purpose threading for a wide range of work requirements.

A triangular stress system confines radial rolling loads in tension and with heavy-duty spindle assemblies provides capacity for rolling loads up to 30,000 lbs. Threads and forms from 1/2" to 2 1/2" in diameter are rolled in aluminum, brass, stainless, and a wide variety of alloy and heat treated steels.

The unit is equipped with a 15-hp motor. Eight standard die speeds from 105 to 695 rpm provide production rates of approximately 6 ipm to over 300 ipm.

The flexibility of this machine makes it adaptable for either large or small quantity production. Standard work handling equipment suitable for a wide range of applications is available for manual, semi-automatic, or completely automatic operation.

Reed Rolled Thread Die Co., 791 Main St., Holden, Mass.

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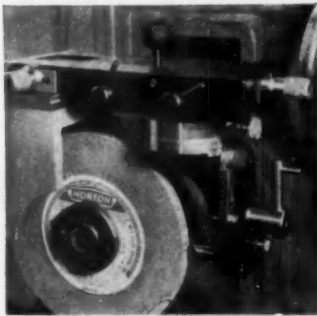


## PRECISION PRODUCTS

*for day-in day-out economy*

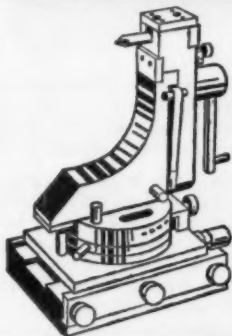
### 7. "FLUIDMOTION" WHEEL GUARD DRESSER

meets modern grinding equipment demands. Spring loaded pin in the feed mechanism permits the dresser to be easily removed after the dressing operation.



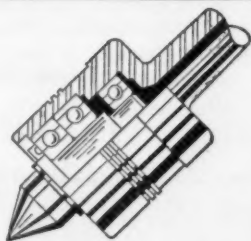
### 4. WHEEL DRESSERS

Hardened, ground & lapped. .0001" accuracy. Forms wheels to shape on surface grinders, tool and cutter grinders, cylindrical grinders.



### 9. H TYPE LIVE CENTER, HEAVY DUTY

for lathes and turret lathes, meets requirements for heavier feeds and high speeds. Tandem flush ground bearings for greater capacity.



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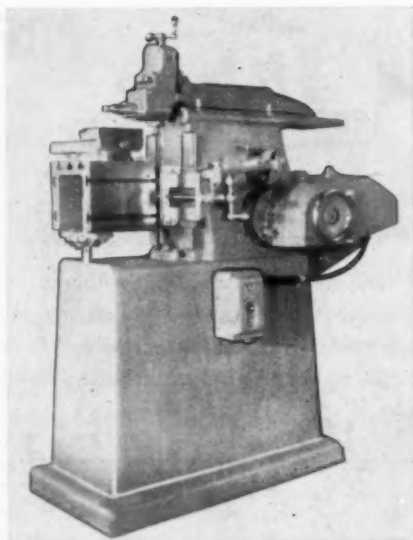
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### Shaper Produces Fine Finishes

An 8" shaper, designed for accuracy and speed, produces extremely fine finishes. The bull gear and pinion are cut right-hand helical angle. The drive gear and pinion are cut left-hand helical angle. This feature actually gives users a herringbone gear effect to the finished surface, adding extra smoothness without gear-tooth reproduction on work.

All operating surfaces of this shaper are ground and hand scraped. Each part is fitted closely to insure positive operational accuracy and longer life to parts.

Standard equipment includes swivel table, swivel base vise with steel faced jaws, toolpost wrenches, necessary cranks, and motor drive arrangements. Bearings are Timken roller on bull gear with single and double row ball bearings on gear shafts.

The shaper is 44" long, 24" wide, and stands 51" high.

Havir Mfg. Corp., 444 N. Cleveland Ave., St. Paul, Minn.

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201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232
233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248
249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296
297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312
313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328
329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344
345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376
377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392
393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408
409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424
425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456
457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472
473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488
489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504
505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536
537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552

Inside Front Cover Inside Back Cover Back Cover

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

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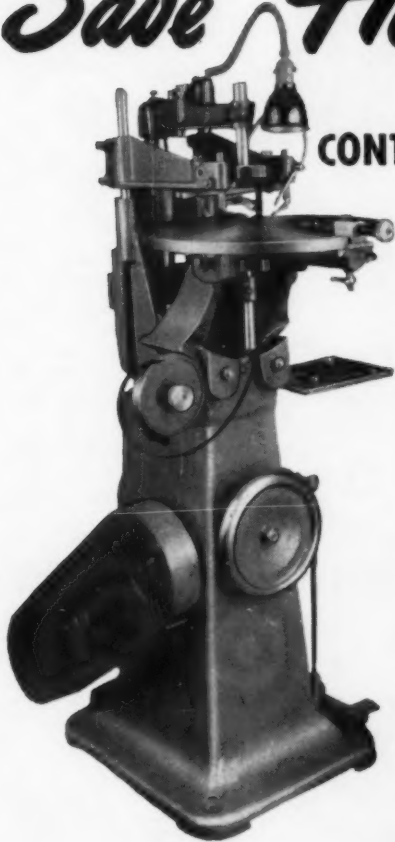
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# *Save Hours* in tool rooms and die shops with **CONTOUR SAWING AND FILING**



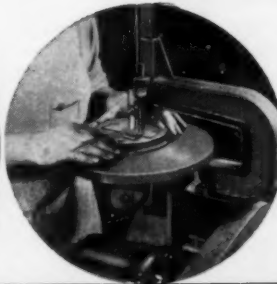
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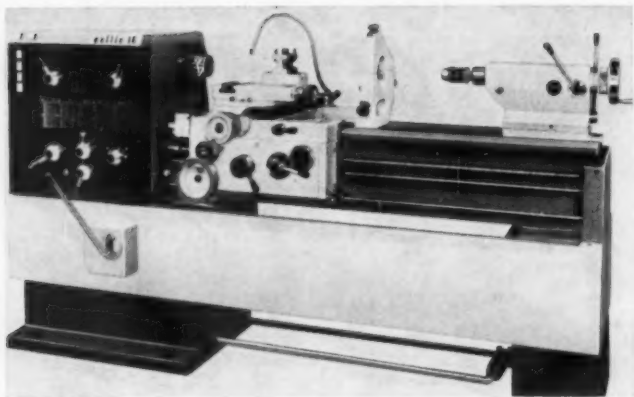
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### Engine Lathes

Alina Corp. has introduced a line of precision engine lathes. Called the Mondiale lathes, they feature functional design, easy operation, standard spindle nose, hardened and ground ways, and heavily ribbed bed.

Five models range in swing from 12" to 20" with 16 or 18 spindle speeds. Maximum spindle rpm range from 1000 to 2000.

Alina Corp., 122 E. 2nd St., Mineola, New York.

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**All sizes and types of throwaway-inserts: HSS; cast alloy; carbide; ceramic. Send prints for quotations on Negative and Positive rake inserts.**

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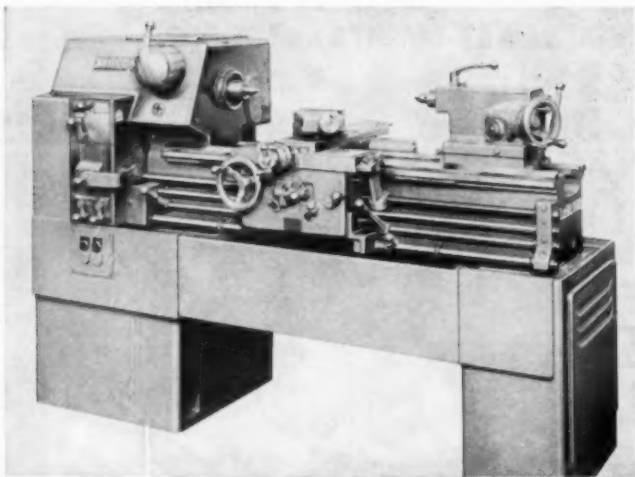
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A dual-drive tool and diemakers' lathe features an apron reverse to lead-screw, single-lever selection of sixteen

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The dual drive headstock provides twelve gear-driven spindle speeds for

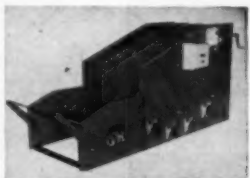
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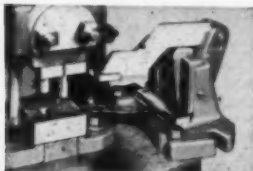


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Moving parts are better protected  
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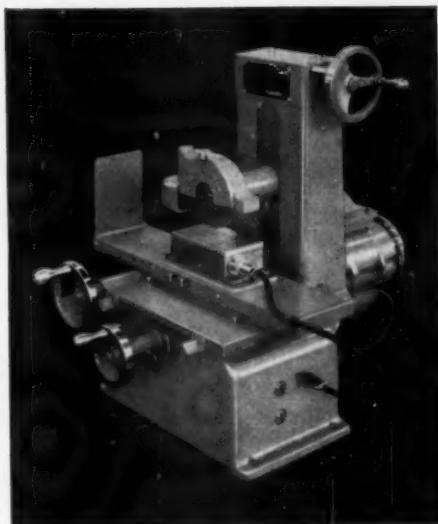
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**NEW WET GRINDING SHIELD**  
Now available to permit easy view-  
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### SPECIFICATIONS

Chuck surface—3" x 5" or 4" x 6".  
Table travel—8", traverse 4".  
Vertical head movement—6".  
Work area under 4" wheel—6", with chuck—4".  
Standard grinding wheel—4" x 3½" x ½".  
Spindle speed—approx. 5500 RPM.  
Motor, ¼ HP, single or 3 ph., dynamically balanced.  
Dimensions—20" x 24" x 22½" high.  
Net wt. approx. 160 lbs.



The New Improved SANFORD Model SG-2 SURFACE GRINDER for intricate, small parts, dry or wet grinding to less than .0001" tolerance. Combination of extreme accuracy, dependability and high production speed is unmatched by any other grinder—large or small—sold today. Fingertip handwheel and operating switch controls. Meehanite castings used in construction insure maximum durability.

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UNION, N.J.

positive power in the lower ranges and four belt-driven speeds for smooth power in the high range. The three bearing spindle uses precision Timken bearings. Lubrication is automatic forced-feed. The electric clutch and brake provides smooth and positive stops and starts.

Reverse to the leadscrew and feed is controlled from the rigid one-piece apron. A single lever engages both cross and length feed through a positive-jaw clutch. A single trip for feeding and chasing in each direction is standard. Quick-set dials are provided for both cross feed and compound rest.

Forty-eight feed and thread changes are available through the totally-enclosed quick change box.

R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

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### Ram-Type Bending Machine

Designed to form flat stock into a multitude of part shapes, a ram-type bending brake has a capacity up to  $\frac{1}{4}$ " x  $2\frac{3}{4}$ " cold rolled steel and operates at speeds to 50 cycles a minute. The machine is powered by a self-contained  $7\frac{1}{2}$ -hp, 2000 psi, hydraulic system, acting through toggles to provide greatly

Designed for Small Parts Treating

**HUPPERT**

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Model No.	Inside Dimensions			Temp. Range	Watts 110 Volts AC	Price
	Wide	High	Deep			
434DL	4 $\frac{1}{4}$ "	3 $\frac{3}{8}$ "	4 $\frac{3}{8}$ "	300°—1600° F.	920	\$ 90.00
439DL	4 $\frac{1}{4}$ "	3 $\frac{3}{8}$ "	9"	300°—1600° F.	1650	120.00
436DL	4 $\frac{1}{2}$ "	3 $\frac{1}{2}$ "	6"	300°—1900° F.	1650	130.00
5DL	4 $\frac{1}{2}$ "	3 $\frac{3}{4}$ "	9"	300°—1900° F.	1750	176.00
9DL	6"	6"	6"	300°—1900° F.	2200	208.00
669DL	6"	6"	9"	300°—1900° F.	3000	248.00
10DL	8"	4"	6"	300°—1900° F.	2000	220.00
849DL	8"	4"	9"	300°—1900° F.	3000	265.00

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Phone HEnderson 1-1911

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multiplied bending force for the ram. A pedestal-type control station actuates the machine electrically. A foot switch frees both hands for fast workpiece handling.

This offset horizontal bending brake produces zero radius bends with consistent accuracy. The sliding ram arm is made of Ampco Metal bronze mounted on tool steel wear strips and adjustable gibs. Dovetail mounted tools slip easily into the ram and toolholder speeding setup and change over. Degree of bend is increased or decreased by convenient hand crank adjustment of the toolholder.

Pines Engineering Co., Inc., 601 Walnut St., Aurora, Ill.

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### Tube-Flaring Machine

A production machine that will trim, square, chamfer, and flare standard

aluminum, mild steel, stainless steel, brass, bronze, copper, and exotic metal tubing, is being produced by Progressive Welder and Machine Co.

This machine is designed for use on standard tubes with  $\frac{3}{8}$ " to  $1\frac{1}{2}$ " OD and .028" to .049" wall thicknesses. It utilizes a two-station operation. Station one trims and squares the tube end, chamfering both ID and OD. Station two flares the tube.

Tubes are clamped in position during the centrifugal action of trimming, squaring, chamfering, and flaring. Since each metal requires special treatment, the machine's control panel contains an electronic speed-control system which is adjustable to control rpm of the dc-drive motor and duration of the flaring cycle.

Progressive Welder & Machine Co., 915 Oakland Ave., Pontiac, Mich.

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### (ADVERTISEMENT)



spring pressures, 8-32 thru  $\frac{5}{8}$ "-11 threads. White Nylon Nose with light spring pressures, 8-32 thru  $\frac{5}{8}$ "-11 threads. Northwestern Tools, Inc. 119 Hollier Ave., Dayton 3, Ohio.

**SPRING PLUNGERS** are now available in four types and thirty-four sizes. Black Penetrate Nose with standard spring pressures, 6-32 thru 1"-8 threads. Cadmium Plate Nose with light spring pressures, 6-32 thru 1"-8 threads. Black Nylon Nose with standard



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**SWING "C" WASHERS** complete with shoulder screws, are now available in four sizes for  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{5}{8}$ " or  $\frac{3}{4}$ " bolt sizes. Write or call today for your free new 16-page catalog. Catalog includes tracing templates of jig and fixture components. Northwestern Tools, Inc. 119 Hollier Ave., Dayton 3, Ohio.

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6" QUILL STROKE IN  
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### Featuring ...

- Heavier Spindle Bearings
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- Heavier—3" Column
- Larger Base
- Reduced Deflection
- 10-Spline Spindle

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Model 1150  
Drill Press



Variable Speed Range  
**475 to 4800 rpm**

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SPEEDS . . . 400 . . . 840 . . . 1580 . . . 2800 . . . 5300  
RPM. Featuring cast aluminum alloy step pulleys and large guard for easier belt changing. Economy priced, it's ideal for smaller shops and schools.

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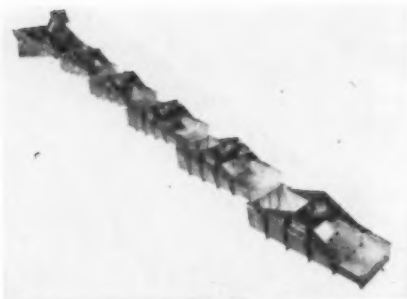
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### Automatic Vibrating Conveyor Washes, Rinses Moving Parts

A vibrating conveyor line, composed of a series of individual feeders, cleans, treats, and rinses small metal parts as they move through production. These all metal feeders cannot be damaged by dust, water, many chemical solutions, or fine vapor.

The first of the six units shown is

submerged in a tank of phosphate-type solution which treats stamped metal parts as they drop into the feeder. Continuous vibration moves the parts up to a 13° slope of the conveyor tray, carrying them out of the solution and discharging them into a second, smaller rinse unit. This vibratory movement both moves the parts at a controlled rate and provides the agitation to give them uniform contact with the chemical solution.

The five smaller units receive a continuous fine spray of water which rinses the parts. Depth of the rinse water is controlled by drains at the rear of each feeder tray. Constant draining eliminates contaminated water while maintaining the correct water level in the tray.

The complete series of feeders carries the parts approximately 21' through the washing and rinsing process before discharging them ready for the next pro-

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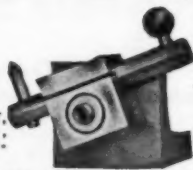
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**Chatter Resistant, Spring Loaded Spindle**  
Hardened shaft—bearing adjustable for wear.  
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BAR.

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ADAPTERS fit your RADIUS DRESSER to Cylindrical and Universal Grinders. LARGE RANGE,  
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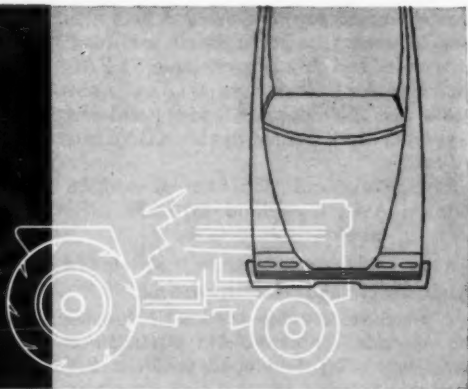
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### SERIES A, AUTOMATIC CYCLE, DRILLING AND TAPPING MACHINES

To meet the needs of industry for precision parts for quality products, Cleereman has developed a full line of Drilling and Tapping Machines.

The latest developments of the Series "A" are Special Purpose Arrangements for small lots or production runs.

- Two or more columns can be mounted on a special base.
- High precision production through use of rotary type index tables.
- The building block concept provides low cost initial investment and basic machine elements for changeover to new and different piece parts.
- Complete automatic cycle push button operation at all stations.
- Ease of set-up, pick-off change gears, broad range of speeds, feeds and tap leads.

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7338 W. Lawrence Avenue, Chicago 31, Illinois

Factory: Green Bay, Wisconsin

Special Purpose Series "A" with  
Rotary Type Index Table.

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duction operation. Submerged feeder is the largest of the six units. It is 8' long, 18" wide, and is powered by a 5" FAC air vibrator. The five smaller rinse units are 2½' long, 18" wide, and are powered individually by 3" KOAC air vibrators.

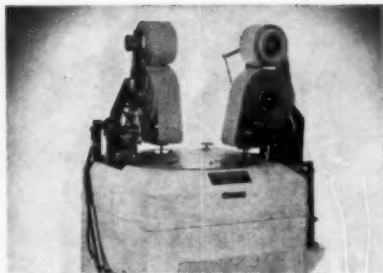
The Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland 13, Ohio.

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### Automatic Parts Finisher

A machine for the automatic finishing of dials, emblems, and other piece parts has been developed wherein the first or second surface depressions are filled and then wiped and polished.

A rotary index table has eight spin-dles that spin in five stations. This table can be equipped to accommodate any combination of five interchangeable accessory heads, including a fill head, a smear wipe, a full wipe, a light buff, and a painting head.



Upon contact with the spinning part, a controlled amount of dial filler is pushed into the depressions. The spinning part is then indexed to the next accessory, such as the smear wipe, where the greater portion of the excess dial filler is removed. The part is then indexed to the full wipe head where the remaining dial filler is removed and the part polished.

Conforming Matrix Corp., 806 New York Ave., Toledo 11, Ohio.

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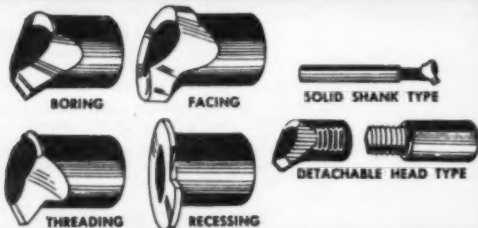
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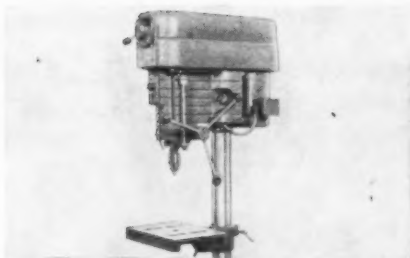
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### Drill Press

A 15" drill press has a complete speed range and full 6" quill stroke now incorporated in a single unit. A variable speed model provides speeds of 475 to 4800 rpm, while the five-speed model affords speeds of 400, 840, 1580, 2800, and 5300 rpm, and features cast aluminum alloy pulleys with a large spring-loaded guard for easier belt changing.

Both versions of this Model 1150 drill press have been designed to mini-

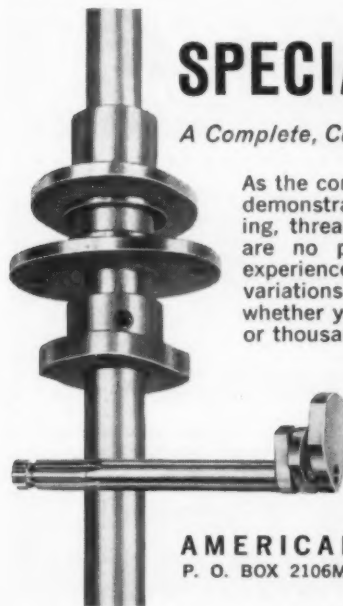
mize deflection and increase accuracy. The units feature heavier spindle bearings, a longer quill and a heavier 3" column for reduced deflection. The machines are standard equipped with a larger tilting table and a ten-spline spindle.

Powermatic Machine Co., McMinnville, Tenn.

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### Machine Deburs and Chamfers

A chamfer grinder, introduced by Michigan Tool Co., utilizes the principle of contour follower grinding. This Model 483 is a six-station automatic machine to remove broaching and burnishing burs. The six stations perform the following sequences: station one unloads and loads manually; station two chamfers outer edge of two slots; station three deburs inner slot, left side; station four deburs inner slot, right side; station five removes burnishing bur; and station six wire



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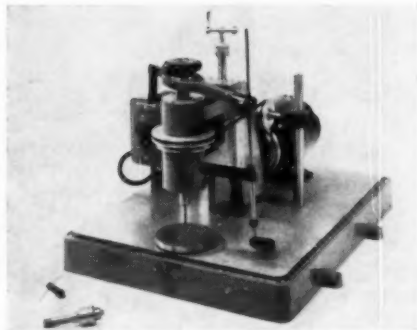
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brushes outer edge of two slots.

Each working station consists of a column with a vertical slide, actuated by a hydraulic cylinder. At stations, two, three, and four, the grinding wheels are driven by air motors which are swivel-mounted with a variable spring load in either direction to follow the contour and compensate for wheel wear. Station five is a cup-shaped tool driven by a low rpm air motor with a floating drive adapter to provide the correct amount of pressure as well as adjusting for tool wear. Station six consists of two air motor driven wire brushes horizontally mounted and spring loaded to maintain correct pressure on the work. Six work holding adapters, each with a clamping collet, hold and locate the workpiece.

Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Mich.

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### Micro Drill Press

F. W. Derbyshire, Inc., has announced a micro drill press for precision drilling of small, fine holes. This press has a throat depth of  $4\frac{1}{2}$ " and the spindle, which slides in sleeves, has a travel of  $1\frac{1}{4}$ ". The column has a micrometer screw and can be adjusted 2" in thousandths.



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Bijur's machine tool styling emphasizes compactness and sturdy construction. Choice of 18 ounce, 1 gallon or 5 gallon units. 4220

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Powered by a 1/12 hp. motor, the press takes standard Magnus-Elect collets in sizes from .004" to .315". It has finger-touch control which affords sensitive drilling of small parts.

F. W. Derbyshire, Inc., 265 Bear Hill Road, Waltham 54, Mass.

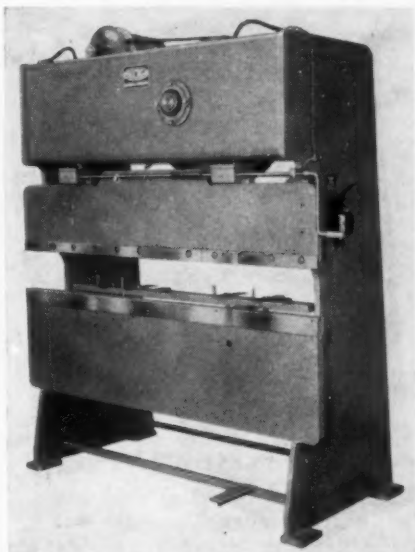
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### Lightweight Press Brakes

Dreis & Krump Mfg. Co. is offering two models in light-duty press brakes both with a 25-ton capacity. Model 265 has an over-all bending length of 72" and capacity of 66" of 14 gage to 48" of 12 gage.

Features include: rigid frame of welded steel plate; a deep section bed and ram; an infinitely variable speed drive and adjustable ram and a 2" stroke.

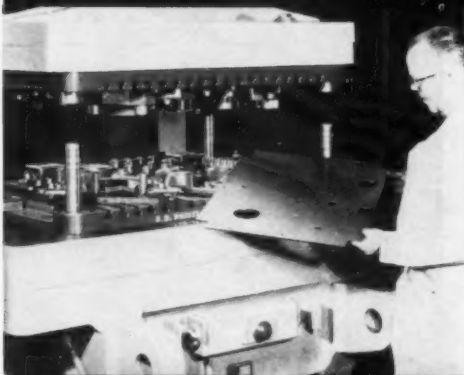
Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, Ill.



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December, 1961

169

TO MAKE SET UPS EASIER QUICKER



## Dust Collector For Grinders

A standard dust collection unit has been job-matched to the Oliver face mill grinder without requiring the slightest adaptation or special installation techniques.

The installation was made with a standard Model 520 Dustkop, which can be attached as shown or can be mounted overhead directly above the face mill grinder. This will permit the Dustkop hood to change from one side of the grinding wheel to the other, as required.

This same unit can also be used on surface grinders, universal grinders, drill grinders, saw grinders, and numerous offhand-type grinders using up to two 6" diameter wheels or one 10" diameter wheel.

Aget Mfg. Co., Adrian, Mich.

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## Dust-Free Work Chamber

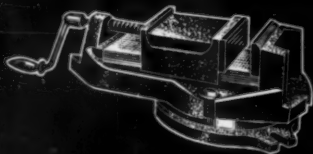
An inexpensive dust-free illuminated work chamber for standard work benches has been developed for use in cleaned and noncleaned areas. The unit is designed to provide high dust prevention for assembly research and test of gyros, ball bearings, semiconductors, and optical and precision instruments.

The cabinet operates under a continuous flow of double-filtered air

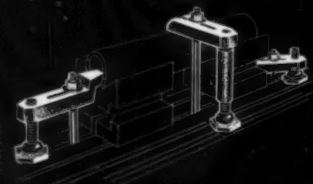
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ADJUSTABLE ANGLE PLATES



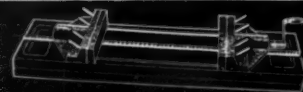
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You'll find the Gaertner Toolmaker's Microscope as part of the standard inspection equipment in the ideally-equipped shop or lab. It will do the work of many single-purpose measuring and inspection instruments with greater convenience and accuracy.

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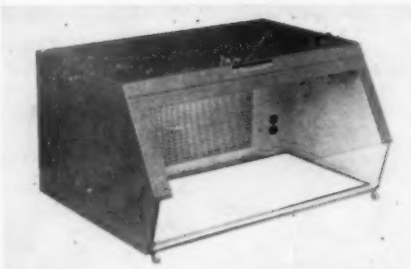
Independent and combined rotation of the cross hairs in the protractor ocular speed up measurements and simplify measuring procedure. The instrument's versatility may be increased through the addition of such accessories as thread and radius templates, camera and spotting attachments, fine motion focus, direct-reading counters, and interchangeable optics for varying magnification and field.

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SCIENTIFIC CORPORATION



which prevents dust as small as .5 microns from entering the work area. Cleaned air passing out of cabinet acts as a shield against lint, pollen, dust, or dust-borne bacteria. The model features a packaged filter unit which protects cleanroom atmosphere when servicing filters. A front hinged panel permits insertion of large work into the 36" x 28" x 18" cabinet.

Specialties, Inc., Skunks Misery Rd.,  
Syosset, N.Y.

Use postpaid card. Circle No. 97



### Portable Spot Welder

A portable spot welder with a built-in timer has a capacity of 3/16" for cold rolled steel and up to 1/8" combined thickness for stainless, galvanized, and cadmium-plated steel. Sheets, rods, bars, and studs of many sizes and shapes can be welded.

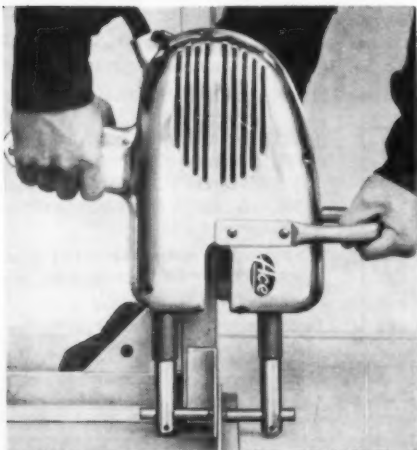
Typical applications include manufacturing and repairing cabinets, shelving, furniture, racks, and machinery; farm implement repair; body and fender work; sheet metal fabrication; gutter work; and stud welding. In light production, as many as 200 to 300 welds per hour can be made, depending on the type and gage of material.

Maneuverability is enhanced by functional design which includes a bail-type handle and pistol-grip. It is claimed that the welder can be used in any position from floor to ceiling.

Features are: the electronic timer with adjustments from 1/60 second to a full second; 100 amp. contactor; independently suspended and completely insulated transformer; rugged construction that permits 1000 lbs. pressure at tips of electrodes; and up to 3" tip opening with 7" throat depth.

Ace-Sycamore, Inc., Sycamore, Ill.

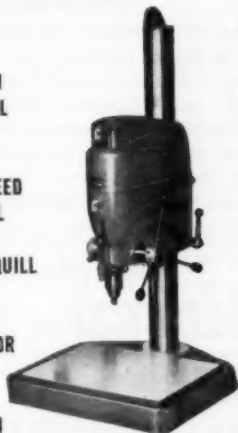
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December, 1961

## Announcing the **EM 605** **PRODUCTION DRILL PRESS** *at new* **LOW PRICE!**

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DRILL-MATERIAL  
CHART
- FINGERTIP SPEED  
SELECTOR DIAL
- INSTANT-SET QUILL  
DEPTH STOP
- BUILT-IN MOTOR
- HEAVY  
CONSTRUCTION



Designed especially for those production jobs requiring a wide range of work plus accuracy and speed. Includes many features of the popular T-M Tool Room Model. 600 to 4,000 RPM. Table and Bench Models.

Write for FREE Literature

**THE ELECTRO-MECHANICAL CO.**  
263 E. Erie Street, Milwaukee 2, Wisconsin

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173



### Hand Surface Grinder

A hand surface grinder, now being built in two sizes, 6" x 12", and 10" x 16", was designed to meet the needs of toolrooms, die makers, school shops, and repair shops for a precision grinder at low cost.

Ease of hand operation was a primary consideration in design. Anti-

friction bearings under the table take the effort out of hand traversing. An adjustable friction brake provides additional drag if desired.

The table traverse hand wheel can be mounted on either side of the table and can be readily adjusted to position the handle for the most convenient short stroke operation.

# decimal size CHUCKING REAMERS in stock! lowest prices... top quality



**HIGH SPEED . . .  
STRAIGHT SHANK  
STRAIGHT FLUTE**

SIZE RANGE	1 to 5 Pcs.	6 to 11 Pcs.
.0300 to .0635	\$3.41	\$2.78
.0636 to .1285	3.01	2.38
.1286 to .1770	3.41	2.78
.1771 to .189	3.61	2.98
.1891 to .2510	3.86	3.23
.2511 to .3134	4.21	3.58
.3135 to .3759	4.46	3.83
.3760 to .4384	4.91	4.28

Prices F.O.B. N. Y. C. warehouse

IN STOCK FOR IMMEDIATE DELIVERY . . . From .030" to .251" by half thousands (.0005) AND from .252" to .400" by thousandths (.0001).

Many other decimal sizes are stocked to 1". 48 hour delivery on any non-stock size!

**Order today . . . Dealer inquiries invited.**

Users of cutting tools find it pays to be on our mailing list. Are you?

**SID TOOL CO., INC./CUTTING TOOL SPECIALISTS**

158-B LAFAYETTE STREET, NEW YORK 13, N. Y. • BECKMAN 3-4270

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The two-speed grinding wheel down-feed hand wheel has graduations of .0005", plus a finer control with a vernier which reads to .0001". For fine feeding or finishing passes, there is a micrometer feed mechanism with reduction gearing that permits feeding in increments of .0001". The 10" x 16" model has cross feed increments as small as .0005". The 6" x 12" model has cross feed graduations in increments of .001". An adjustable friction brake also provides drag on the cross feed.

Work height capacity under a full sized grinding wheel is 12" on both models. The saddle has a guide rail design to give accurate crossfeeding.

Heavy ribbed construction of vital parts prevents distortion under load and any tendency of the wheel to cock under heavy feed.

The antifriction bearing spindle is mounted in a cast housing which supports the spindle right to the end. The

wheel guard is hinged for ease in changing wheels.

Norton Co., Machine Tool Division, Worcester 6, Mass.

Use postpaid card. Circle No. 99

### Portable Industrial Cleaner

A bench model vacuum cleaner, introduced by the American Cleaning Equipment Corp., is small, compact, and easy-to-carry. It is designed for cleaning parts and equipment.

Called the Model 380-4, it has a tank capacity of 4 gal. and weighs 16 lbs. Operated by a 3/4-hp. by-pass motor, the vacuum unit has an air velocity maximum of 340 mph and an air volume of 123 cfm.

The design, incorporating the cloth bag inside the tank, eliminates the usual external filter bag and scrap trap.

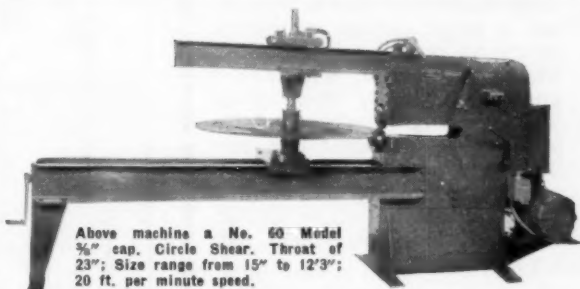
American Cleaning Equipment Corp., 5024 N. Rose St., Schiller Park, Ill.

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**BLUE VALLEY**

## FLANGING MACHINES and CIRCLE SHEARS

- No. 1 10 Ga. Circle Shear and Flanger.
- No. 3 1/4" cap. Flanger for flat heads 19" to 12'.
- No. 4 3/8" cap. Flanger for flat and dished heads 20" to 12'.
- No. 5 1/2" cap. Flanger for flat and dished heads 24" to 20'.
- No. 6 5/8" cap. Flanger for flat and dished heads 24" to 20'.
- No. 7 3/4" cap. Flanger for flat and dished heads 20" to 20'. Up to 8" knuckle radius.
- No. 56 Model 3/16" cap. Elliptical Head Shear and Flanger.



Above machine a No. 60 Model 3/4" cap. Circle Shear. Throat of 23"; Size range from 15" to 12'3"; 20 ft. per minute speed.

No. 40 Model 1/4" cap. Circle Shear; Throat of 15 1/4"; Size range from 15" to 12'3".

**BLUE VALLEY MACHINE & MFG. CO.**

6832 Truman Road KANSAS CITY 26, MO.

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## RAISE GRINDING PRODUCTION



FOR \$2.70



A typical Desmond Huntington grinding wheel dresser costs about \$2.70 from your distributor, yet it substantially increases grinding production, makes wheels cut better, and lowers grinding costs. By dressing all your grinding wheels regularly you remove inefficient dull particles and loaded metal, expose a fresh new grinding surface. Your Desmond distributor can furnish the exact model you require. Ask his advice.

*The only complete line of  
grinding wheel dressers and cutters*

# Desmond

The Desmond-Stephan Mfg. Co.  
Urbana, Ohio

Use postpaid card. Circle No. 299



### Production Drilling Machine

A 1 1/4" capacity high-speed, geared-head, pillar drilling machine features a dial-type speed selector and a motor integrated in the head for direct all geared drive.

The machine has a sliding head with safety ratchet on the head elevation, adjustable Timken bearings in the No. 3 Morse taper spindle, and three power feeds that can be selected by dial-type



"Tell him about the time you fell in extruder, Ryffel."

control with positive depth stop and overtravel protection. The switch is foot controlled for forward/reverse and on/off.

Drilling capacities are 1¼" in cast iron and 1" in steel. Drilling depth is 4¼" and the swing measures 23½". The machine is available in two models: one with six spindle speeds having a range from 115 to 1690 rpm; and the other has 12 speeds from 115 to 3240 rpm.

Bentley Industrial Corp., 21-19 46th Ave., Long Island City 1, N. Y.

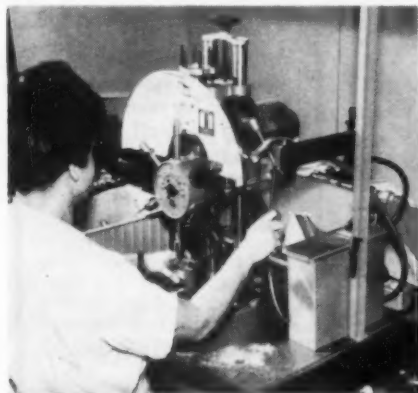
Use postpaid card. Circle No. 101

### Drill for Aluminum Valves

A turret drill has been developed which will machine die cast aluminum valve bodies that require the drilling of eight holes and the tapping of three.

In this operation, the die cast aluminum valve bodies are held in a special drill jig. The first four spindles carry 1/16", 1/16", 3/16", and a No. 36 drill respectively. The fifth and sixth spindles each carry a "3000" Burgmaster tapping head.

Sequence of operations include drilling four holes 5/16" deep at 3,300 rpm; one hole 3/16" deep at 2,200 rpm; one hole through at 2,200 rpm, one hole through and one hole 5/16" deep at 3,300 rpm. Tapping is done at 350 rpm.



December, 1961

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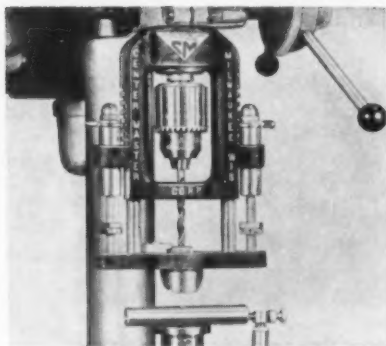
112 WEBSTER ST., DAYTON 2, OHIO

Use postpaid card. Circle No. 300









### Drill Press Attachment

A drill press attachment, called Center Master, offers controlled and completely uniform operations for drilling, counterboring, chamfering, and reaming. The Center Master can hold, locate, and guide the cutting tool on any round, hexagon, or square part.

The unit is attached to the quill of any  $\frac{1}{2}$ " drill press. The drill press chuck is located in the center of the unit frame. The drill, reamer, or counter-bore passes down through a bell-bushing or vee-bushing depending on the type of work. A 100-lb. spring pressure on push rods holds the work securely in place. Adjustable stops control the cut depth and the unit is also adjustable for various diameters or stock sizes. In the majority of cases, drill jigs or special holding fixtures are eliminated.

This Center Master can be set up for burr or nib cut-off, off-center drilling, and special drilling with vee-bushings. Burrs or nibs are removed by using an off-center bell-bushing that allows a flat bottom drill to cut off the nib.

Portage Double-Quick, Inc., 1037 Sweitzer Ave., Akron 11, Ohio.

Use postpaid card. Circle No. 104

New standard for power and torque in a compact grinder!

## NEW Dremel No. 3 Industrial Moto-Tool



Breakthrough in small grinder design! New, powerful Dremel No. 3 operates at 27,000 rpm — and sustains high torque under load. And it weighs only 17 oz.! Its compact size, non-tiring, cool-running operation makes it ideal for industrial applications — grinding and polishing of dies and molds, production deburring, patternmaking, general tool room use. 110 V AC or DC motor has heavy-duty, shockproof case. No. 3 Moto-Tool complete with  $\frac{1}{8}$ " and  $\frac{3}{32}$ " collets, 3-wire grounding cord and 2-prong adapter, finger grip, in steel storage case... \$29.95.

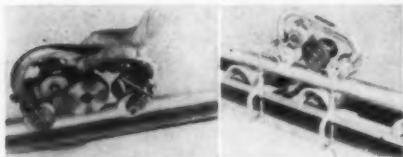
Order From Your Supplier or Write for Industrial Bulletin



DREMEL MFG. CO., Dept. 211-L, Racine, Wisconsin

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## BAR and TUBE PRINTER for hand or conveyor use



Rolled by hand along rounds or flats, or mounted over conveyor rolls, this printer provides simple, economical identification code printing. Guide rolls adjust and center printing wheel for clear marking on metal or plastic  $\frac{1}{4}$ " diameter up.

Wheel accepts E-Z Set rubber type in single type characters or complete legend in one strip. Easily pressed into place, or stripped off for quick change.

Sponge rubber ink roll holds enough ink for 8 hours; easily interchanged for color code change.

Lightweight magnesium frame, rugged construction; weight 7½ lbs. Write for literature, Model T-55.

## PANNIER MASTER MARKERS

272 Pannier Bldg., Pittsburgh 12, Pa.

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## RIVETERS.

**GRANT**

PIONEERS  
and  
PACEMAKERS  
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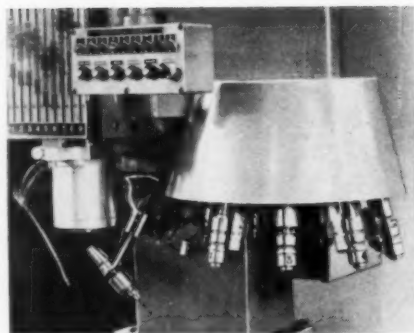


head rivets from smallest to  $\frac{1}{2}$ " diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindle.

Write for literature and don't forget to send samples

THE GRANT MFG. & MACHINE CO.  
CE Station Bridgeport 5, Conn.

Use postpaid card. Circle No. 304



## Five-Second Tool Changer

An automatic tool changer has been developed as accessory equipment for a drilling and tapping machine. According to the manufacturer, this tape controlled unit will speed up all drilling and tapping operations by making tool changes automatically, freeing the operator for other work. Changes can be made in 5 seconds, and the tools can be selected out of sequence as required by the tape or manual selection.

The unit can carry up to nine different cutting tools which can be man-



You needn't worry about automation, Ches. No machine could possibly be as erratic."

ually selected during setup. Once the tools are selected, they are fitted with adapters and seated in the individual storage positions in the rotating matrix. Then the numerical control tape makes tool changes and directs the drilling operations automatically with no attention from the operator.

This device requires a minimum of clearance between the top of the work and the point of the tool when it is in position. The longer tools require as little as  $\frac{7}{8}$ " clearance over the top of the work and the shorter tools require slightly more.

Edlund Machinery Co., Dept. A, Cortland, N. Y.

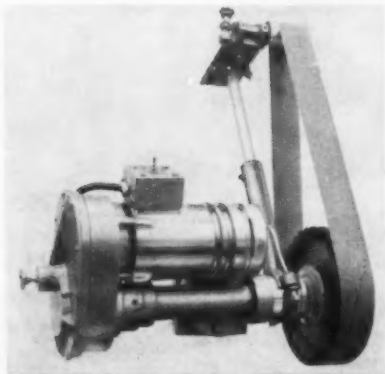
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### Versatile Grinding Machine

An O.D. abrasive belt or I.D. abrasive sleeve grinder for rough grinding or superfinishing has been designed for lathe, planer, or bench mounting. It will operate on most basic machines.

Due to its extreme light weight (60 lbs.), positioning problems are minimized. Called a Versagrind, it has a 2 hp, three phase, continuous duty motor which has two speeds. The motor has a geared head with 2350 rpm for O.D. abrasive belt grinding and 4850 rpm for I.D. abrasive sleeve grinding.

On lathes of 16" swing or over, the Versagrind is mounted in the tool post



## Angle Tangent to Radius WHEEL DRESSING *Simplified*

WITH  
**ROTHFUSS TOOLS**



### THE G-5 RADIUS DRESSER

is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on all wheels up to 10" and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation.

Price \$80.50

### THE G-2 ANGLE DRESSER AND TOOL HOLDER



Price \$87.50

is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up jobs to be milled, drilled, tapped on any desired angle.



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**\$149.50**

(including case  
and both tools  
with diamonds)

### FREE STORAGE CASE

of light-weight steel, with a hinged top, heavy duty latch and a blocked interior to insure the safety of the dressers when carried.

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will dress most radii and angles tangent each other, similar to those shown below.

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tee-slot. On smaller lathes, the compound should be removed. The idler arm swivels a full 360° to allow grinding against the contact wheel or on the slack of the belt for contour grinding. A quill is furnished for I.D. abrasive sleeve grinding.

Larmet Co., 108 Wiggs St., P.O. Box 193, Griffith, Ind.

Use postpaid card. Circle No. 106

### Electronic Device Pinpoints Transfer Press Malfunctions

An electronic device which signals the exact location of malfunctions in slide transfer machines and shuts down the press automatically before damage can occur has been announced by Wintriss Controls, Division of Industri-  
onics Controls, Inc.

Failure of die blank work to transfer from one station to the next, for instance, will not only cause the unit to halt the press immediately, but the station where the potential problem

lies is indicated to the operator by signal light on a control panel. The signal lights can be positioned on or off the press or in a remote location.

It compensates for temperature changes, voltage fluctuations, and normal mechanical changes which can occur as the press warms up. Built-in auxiliary units also protect operating machinery from such dangers as buckling, end-of-material, and misfeed.

Wintriss Controls, Division of Industri-  
onics Controls, Inc., 20-24 Vandam St., New York 13, N.Y.

Use postpaid card. Circle No. 107

### Electronic Micrometer

Operator discrimination is completely eliminated with the Model HDR Carson-Dice electronic micrometer. Measurements are displayed on a four-digit counter reading to 20 millionths of an inch. The reading is always the same regardless of who presses the switch

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EISLER INDEXING TURNTABLE THIS MODEL IS MADE FROM 4 TO 24 STATIONS GENEVA GEAR INDEXING INSIDE THE HOUSING COMPLETELY ENCLOSED ARRANGEMENT MADE IN SEVERAL SIZES



**EISLER ENGINEERING CO., INC.**

762 SOUTH 13th STREET

NEWARK 3, NEW JERSEY

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since the operator has no control over the measuring function.

No gage blocks are necessary within the measuring range of the instrument. It is its own reference standard and the micrometer tip is zeroed in against the optically flat work surface. The Model HDR is not a comparator but is a true screw thread measuring instrument.

The advantage of this electronic micrometer is that it permits measurements on conducting parts to be taken at zero pressure, or no measureable deflection of the part if it is fragile or compressible. For nonconducting materials, or where a standard reference measuring pressure is desirable, a special tip, providing adjustable hold down pressures of 1.5, 5, 10, and 20 grams, can be slipped on the micrometer spindle in place of the conventional micrometer tip.

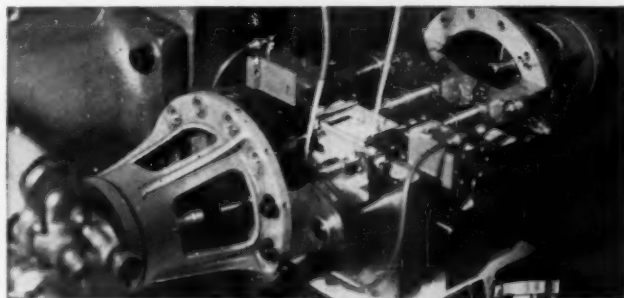
J. W. Dice Co., Englewood, N.J.



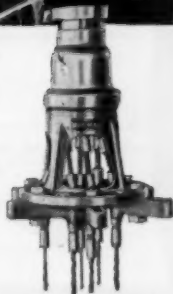
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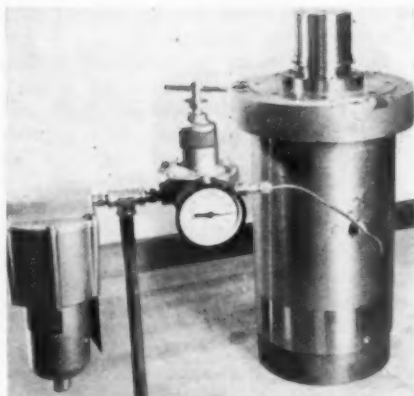
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### Air Bearing Spindle

Rotational accuracy of one millionth of an inch has been achieved in externally pressurized air bearing spindles.

Both radial and axial runouts are held to a millionth. Two of the spindles have been incorporated into ultra accurate roundness testing equipment used in Minneapolis Honeywell's electrostatic gyro program.





The spindles, soon to be marketed under the trade name of ZERON, use annular capillaries to control fluid flow through the bearing, eliminating the need for conventional pads and orifices.

The spindles have a radial deflection rate of  $2\frac{1}{2}$  millionths per pound and an axial rate of  $\frac{1}{2}$  millionth per pound when they are operated on filtered shop air at 170 psi. Proportionally greater rigidity is possible with pressures up to 2,000 psi. Air consumption is unusually low, approximately 2 cfm at 170 psi.

Professional Instruments Co., 6824 W. Lake St., Minneapolis 26, Minn.

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### Electric Embossing Machine

Automark Business Machines Co. has designed an embossing machine for making address plates. The machine operates electrically from a keyboard at speeds of over 100 characters per minute and will emboss all styles of plates now in use. It features an automatic line space, automatic carriage return, back space, and rapid carriage traverse.

A standard machine is easily converted to punched card or punched tape control, yet can still be manually operated from the keyboard.

Automark Business Machines Co., 430 Industrial Drive, Maryland Hgts., St. Louis, Mo.

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1/32" thru 3/16" in  
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2, 3, & 4 Flutes  
Flat & Ball Ends  
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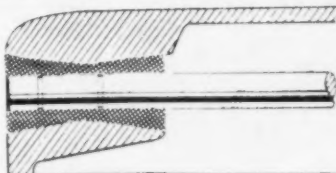
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These radial saw slide rods are aligned in oversize holes with holding fixtures and secured with molten CERROMATRIX. In this application a few pounds of alloy saved 37 hours machining time. Send for full information.



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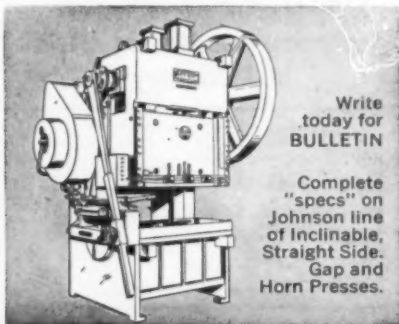
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Complete  
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**Johnson**  
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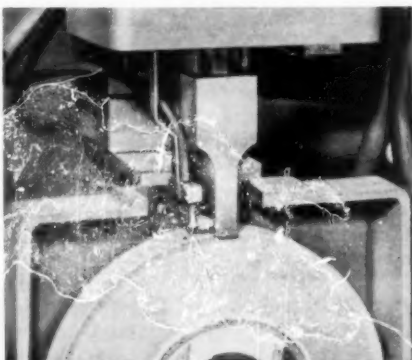
JOHNSON MACHINE & PRESS CORP.  
620 W. INDIANA AVE., ELKHART, INDIANA

Use postpaid card. Circle No. 313

**Ultrasonic Unit to Prevent  
Loading of Grinding Wheels**

An ultrasonic unit, designed to improve the performance and life of any grinding wheel, has been produced by the Cavitron Equipment Corp.

Known as the Ever-Grind, this device speeds up production by reducing excessive loading on the wheel, thus cutting the need for frequent dressing and downtime. Because it prevents build-up of particles in the open abrasive structure of the wheel, it permits the use of finer and harder grinding wheels.



The Ever-Grind uses a magnetostrictive transducer, driven by a generator operating on 60 cycle line current and converting it to vibrate the transducer at the rate of 20,000 cycles a second. An aluminum tool, attached to the end of the transducer, is positioned close to the grinding surface of the wheel. As coolant is passed through the tool and on to the surface wheel, bursting bubbles (cavitation) are induced within the agitated fluid and explode against the grinding wheel as it rotates, simultaneously blasting away any buildup of metal particles and cooling the wheel.

Cavitron Equipment Corp., 51-02 21st  
St., Long Island City, N.Y.

Use postpaid card. Circle No. 111

### Boring-Facing-Grooving Tool

A boring, facing, and grooving tool provides precision boring and facing operations with one tool and only one setup. The tool can also be used to produce counterbores, back counterbores, and for O.D. turning, chamfering, and both I.D. and O.D. grooving.

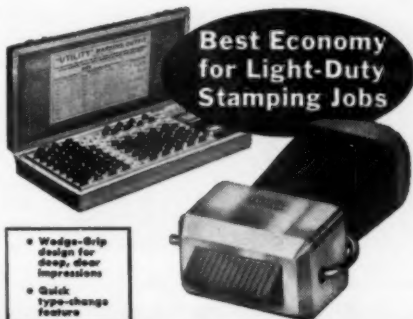
As a boring head, it provides two features: an easy-to-read graduated dial around the entire body; and a large vernier which permits adjustment to .0001". The tool need not be locked during finish boring cuts. The lead-screw and nut hold the tool tightly without creep, providing full accuracy of the adjustment.

The tool is available in three sizes: the two smaller units provide .0025 ipr facing feed and .100 rapid return; and the largest provides .005 ipr feed, .200 return. Feed and rapid traverse are accomplished without stopping or reversing the spindle. A positive stop is provided along with an overload clutch to eliminate damage to tool or work. Once the stop is positioned and locked, the tool will repeat diameters precisely.

Maxwell Industries, Inc., 493 E. 5th St., Ashtabula, Ohio.



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- Wedge-Grip design for deep, clear impressions
- Quick type-change feature

Outfits include from 80 to 154 pieces of type—plus a holder made from non-spalling, non-mushrooming Mecco Safety steel. Write for Bulletin UT.

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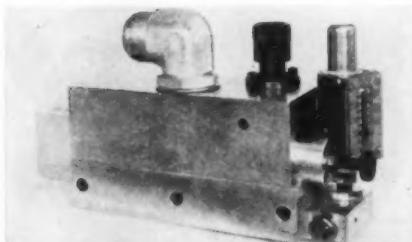
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CATALOG #208

Drill press vises, angle vises, swivel machine vises, rotary tables, lathe milling attachments, production vises, heavy duty angle vises and adjustable angle plates are illustrated and fully described in this new Palmgren Catalog. 70 different models and types—vise jaws from 1½" to 8".

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#### **Press Intensifier Valves**

A series of press intensifier and die cushion valves have been developed to improve design and production of metal stampings.

Called the Hydro-Die series, the attachments are fixed to the ram of hydraulic and mechanical forming and stamping presses, acting as pressure boosters which enable the die to exert

## **Hakansson** **band saw blades**

### **THE INDUCTION HEAT TREATED SAW BLADE**

**For faster cutting, longer lasting band saw blades, specify HAKANSSON . . . backed by 70 years of heat treating experience . . . HAKANSSON pioneered the induction process of heat treating band saw blades.**

**SWEDISH STEEL**—This induction heat treating process coupled with world renowned Swedish Steel means greater blade strength for sawing the toughest materials.

**MILLED TEETH**—Precision milled teeth design for speedy chip relief, thus eliminating jamming of soft materials.

#### **VERY HIGH FRACTURE RESISTANCE**

**WIDE SIZE RANGE**—HAKANSSON blades are available in ALL widths and tooth sizes.

**FREE . . .** write today for your free copy of our handy band saw reference chart.  
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## **Hakansson Industries Inc.**

12933 S. Stony Island Ave.

Chicago 33, Illinois

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considerable controlled pressure in holding and forming the metal blank.

The unit is based on the principle of a self-contained hydraulic oil system and is composed of an aluminum bodied valve, a small oil storage tank, and a low pressure air line (40 to 80 lbs.) connected to the tank and pistons by an aluminum safety connector. The valves create thousands of pounds of

additional pressure generated by the stroke of the press. Accumulated pressure, metered by a knob adjustment, is cushioned to provide a constant die pad hold-down pressure throughout the stroke.

Other features include the gradual unloading of great quantities of oil without objectionable valve bounce, cushioned impact, and prevention of



### **one piece stainless steel spindle**

**HARDENED AND GROUND FROM THE SOLID**

- Reads to .0001" • Heavy duty tungsten carbide measuring faces
- Forged frame • Dull chrome finish on thimble and barrel
- Quick acting positive lock • Built for accuracy under the most rugged applications • Furnished in handsome contour case



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## **ALINA CORPORATION**

122 East Second St., Mineola, L. I., N. Y.

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air in the system from converting to foam.

The valves range from 3" x 4" x 5" up to 10" x 12" x 20". Cushions are available up to 24" x 30" x 60".

Hydro-Die Division, Di-Dro Engineering, Inc., 2405 E. Grand Blvd., Detroit 11, Mich.

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### Lightweight 1/2" Drill

A heavy-duty 1/2" drill has been designed for builders, electricians, plumbers, mechanics, and maintenance men. It is 5 lbs. lighter and 4" shorter than most comparable industrial drills.

This Model 372 features a heavy-duty 3.6-amp. motor and all ball bear-



## NEW "BUILDING BLOCK" UNITS for ULTRASONIC MACHINING

Sheffield-Cavitron® offers a complete line of ultrasonic generators, work heads, tooling, work-holding devices and automatic loading and cycle controls. You can begin with a single unit, as simple as the one shown, (which dices small lots of semi-conductors) and work stations can be added as needed, to the original generator, with greatest economy . . . Write for bulletin H7-59 "Machining the Unmachinable."

The **SHEFFIELD** Corporation • Dayton 1, Ohio  
A subsidiary of The Bendix Corporation

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ing construction that makes it ideal for the toughest drilling jobs.

The drill has a capacity of  $\frac{1}{2}$ " for steel and 1" for wood. A speed of 750 rpm for all-around drilling of metals and woods is maintained through efficient heavy-duty three-stage gear drive.

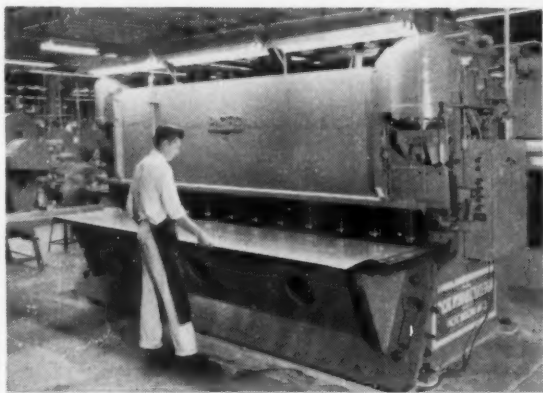
Other features include: a straight across design, chuck flush with the

gear case, which permits drilling in hard-to-reach places; and a precision three-jaw-gear key chuck for positive nonslip gripping power that eliminates bit run-out.

Rockwell Mfg. Co., Power Tool Division, 400 N. Lexington Ave., Pittsburgh 8, Pennsylvania.

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## **PACIFIC HYDRAULIC...THE VERSATILE SHEAR** that cuts heavy plate or tissue-thin metal within thousandths of inch



Pacific Hydraulic is a general purpose shear handling a complete range of metal thicknesses within capacity. With both knife clearance and rake angle quickly and easily adjustable, shear can be used alternately for heavy duty plate work or fast, accurate shearing of thin sheet. At Alameda Naval Air Station,  $\frac{3}{8}$ " Pacific Shear (above) is quickly set to .001" knife clearance for .005" sheet and reset rapidly and easily for cutting plate up to  $\frac{3}{8}$ " thick. In any plant, large or small, a single Pacific Hydraulic will shear a complete range of metal thicknesses at substantial savings in capital investment and operating costs.

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### **PACIFIC PRESSES & SHEARS**

848 - 49TH AVE., OAKLAND, CALIF.: also MT. CARMEL, ILL.

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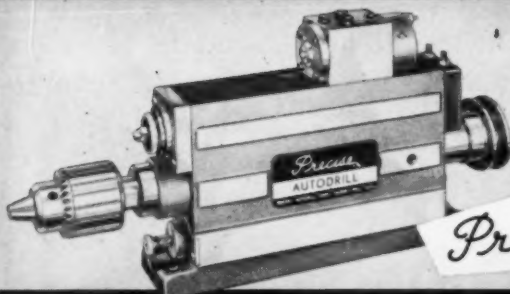


### Chamfer and Countersink Tools

Two products just introduced are a multiple-flute chamfersink and a single-flute countersink.

The chamfersink has been designed for chamfering and light countersinking of nearly all materials. The teeth were originally designed for countersinking hard plastics, fiberglass, and similar materials. This chamfersink will work also

COMPACT . . . ONLY 2" WIDE!  
DRILLS 5/16" IN STEEL!



### PRECISE AUTODRILL

It takes little space (just 2" wide, 12" long, 7" high) — mounts in any vertical or horizontal position on 2-inch centers — has 5/16" drilling capacity in steel! Precise Autodrill is a fully automatic drill unit with depth accuracy to .001". It's electrically operated, has air controlled advance and retract with continuously variable hydraulic infeed. Maximum stroke is 1 1/4". Spindle speeds range up to 6000 rpm. Compact, modular design permits single or multiple setups — an electric and pneumatic interlock is provided for automated setups. Two compact tapping heads are available — handle up to #10, and 5/16" taps.

*Precise*

Grinder-Millers, Power Quills, Jig Grinders,  
Milling Machines, Automatic Drill Units,  
Cutting Tools, Vapor-Lub Cooling,  
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Quality and Precision Since 1882

#### PRECISE AUTODRILL CORPORATION

3731 Blue River Road, Racine, Wisconsin, U.S.A.

Branch Plant: Precise, G. m. b. H., Duesseldorf, Germany

Franklin adv. P103

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in ferrous and nonferrous materials where chamfering, deburring, or light countersinking is required.

The countersink has been designed for fast and precise countersinking in a large range of materials, including the tough and highly abrasive exotic metals now in common use. This is available in 60°, 82° and 90° inclusive angles. It can be obtained in almost any

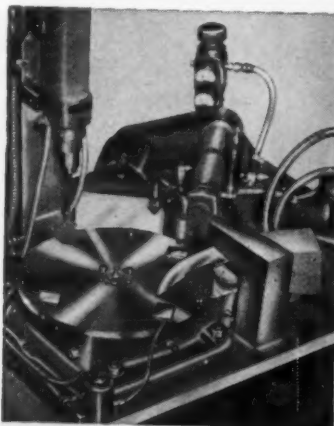
angle, as special, if required.

Dixie Tool Industries, Inc., Bridgeport, Mich.

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### Dual-Range Electronic Welder

A solid-state, capacitor-discharge welder power supply with full circuit switching for each of two ranges is



  
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essentially two power supplies in one. Maximum versatility in this voltage regulated unit is achieved by rapidly switching from a low range of .04 to 9 watt-seconds to a high range of .2 to 45 watt-seconds, as required.

Typical applications include fine whisker-wire attachment to semiconductor leads, microcomponent lead attachment in deposited thin-film circuitry in the low range, and connect-

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Get both with **COOLEY**  
a complete line of heat treating  
**FURNACES and OVENS**

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## COOLEY ELECTRIC MFG. CORP.

36 S. Shelby Street • Indianapolis 7, Indiana

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MODEL  
U-75 SM

### CHECK FIRST WITH COOLEY FOR:

- ✓ GAS ATMOSPHERE TOOL ROOM FURNACES
- ✓ AIR DRAW FURNACES
- ✓ BENCH TYPE FURNACES
- ✓ HIGH SPEED ELECTRIC FURNACES
- ✓ ELECTRIC RECIRCULATING OVENS
- ✓ INDUSTRIAL BOX FURNACES

ing component leads to circuit ribbon in high-density packaging in the high range.

Output energy is maintained within 1% for voltage regulated input variation between 100 and 130 volts ac. Discharge time is approximately .001 second. This Model 1059 meets all specifications for voltage regulation. No warmup time is necessary and both Model 1059 and a companion unit,

Model 1058, are based on the asymptotic charging principle. Model 1058 is identical to 1059 except for voltage regulation.

Controls include stepless heat selector, watt-second meter, range selector, weld setup switch, and on/off switch.

Weldmatic Division, Unitek Corp., 950 Royal Oaks Drive, Monrovia, Calif.

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Equipped with variable table feed and table dwell • Rapid infeed and retraction • Interlock of wheelhead motion with workhead motor • Automatic pick-feed • Extra tailstock dresser, and many other tested features.

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ENGINEERED TO GRIND:

Round to .00002" • Parallel within .00001"  
Repeat to .00001" • Finish to 3 micro-inches



Still the best value in grinding machines

MG12-H	Standard hydraulic machine .....	\$4,350.
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### Tap Chuck With Driver

A Model '09 tap chuck combines absolute concentricity with a positive drive device that completely eliminates tap slippage. The compensating positive drive accommodates all sizes of taps within the range of the tap chuck. The driver consists of a slotted bar free to shift within the body of the tap chuck. Set screws at each end of the slotted

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**SAVE LABOR!**



Kent - Owens advanced features mean speed, accuracy and dependability . . . for short run or high production milling. Rugged . . . simple in design and operation. Saves labor . . . reduces costs! Write for bulletins on wide range of hydraulic and hand-operated machines. Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20 Milling Machine  
Table, 42" x 12"  
Table travel, 20"

**KENT-OWENS**  
*Milling Machines*

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bar grip the square shank of the tap in the slot. Thus, the tap is held rigidly and in perfect alignment with the machine spindle by the collet, but positive drive is provided by the driver.

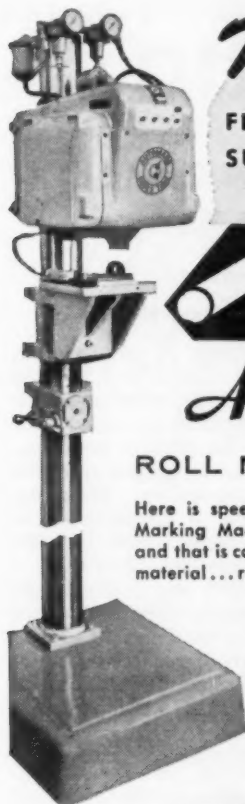
The collets employ a double-angle design which assures concentricity to within .0005" TIR.

The '09 tap chuck is available in three sizes: E09 accommodates taps to 1/4";

F09 has a range to 7/8"; and G09 has a range of 1/2" to 1 1/2". The tap chucks are available with shanks for any spindles. They are specifically recommended for leadscrew tapping and for applications involving precision tapping operations. A bushing-type collet is also available with the same compensating driver.

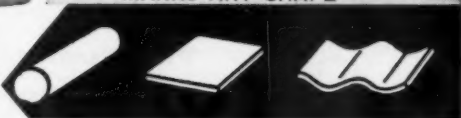
Erickson Tool Co., Solon, Ohio.

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**FLAT, ROUND, CONTOURED**  
**SURFACES at HIGH SPEEDS!**

MARKS ANY SHAPE



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**Automark®**  
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**ROLL MARKING MACHINE**

Here is speed, versatility and adaptability in a Marking Machine that operates by air pressure and that is controlled electrically. Marks any shape material...round, flat or contoured.

**CUTS PRODUCTION COSTS...  
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The Automark operates at speeds up to 6,000 or more 1-inch strokes per hour, or 1,400 strokes per hour on stroke of ram and die slide combination. Think of all the saving in time and money with Automarks in your shop!

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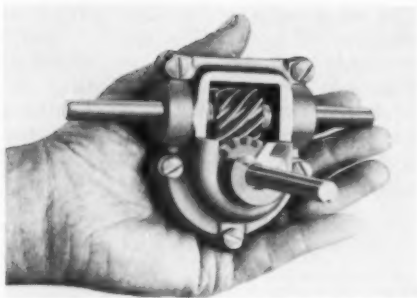
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**DEFIANCE MACHINE & TOOL CO.**

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### Gear Drive Coupling

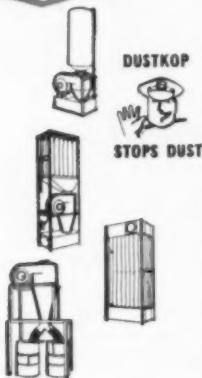
A miniature 1 to 1 universal right angle gear drive is self-aligning and infinitely adjustable, with high horsepower and torque capacity. It utilizes hardened helical gears for rugged operation, and aluminum housing for lightweight, and compact design for use where space is limited.

Right and left hand units are available for any requirement. Both can be



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### For Custom Dust Collection



A full range of job-tailored, standard DUSTKOPS — to serve single or multiple machine installations — is ready to answer your individual collection problem. Whether you're engaged in manufacturing, processing, converting or packaging, if air-borne particles are a factor, Aget has the answer — *your* answer.

DUSTKOPS are easier to install, save space, save money and are virtually trouble-free. Write for your copy of our free brochure to help you select the proper unit for your needs. No obligation, of course.

Also a complete line of mist collectors.

# AGET

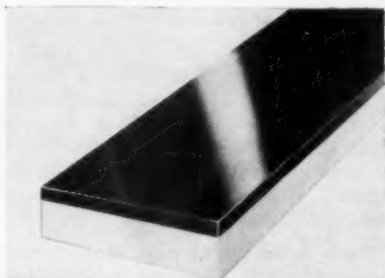
**MANUFACTURING COMPANY**  
1402 Church St., Adrian, Michigan

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used on the same drive train to operate drives in opposite directions at the same time.

Tol-O-Matic, Inc., 246 10th Ave., South, Minneapolis 15, Minn.

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An economical type of bronze liners and wear plates for diemaking is made

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### CUTTING TOOLS



MICRO SMOOTH  
BACK OFF

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SHARP CUTTING  
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**DIXIE TOOL INDUSTRIES, INC.**

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by bonding aluminum bronze to a soft steel backing.

The aluminum bronze has a Brinell of 230 to 250. The clad construction, in addition to supplying a superior grade of wear resistant bronze, results in greatly reduced costs, since the expense of using a full thickness of bronze is eliminated.

These wear plates also have greater tensile strength. They are finish ground

to .0005" parallel and flat. They can be drilled and counterbored through the bronze surface and the soft steel backs are easily machined to suit the die. They have a minimum of 3/16" of bronze on required surfaces.

These bronze clad wear plates are available in stock in a variety of shapes and sizes. Seventeen different sections are provided. Each section is available in 72" lengths, in widths from



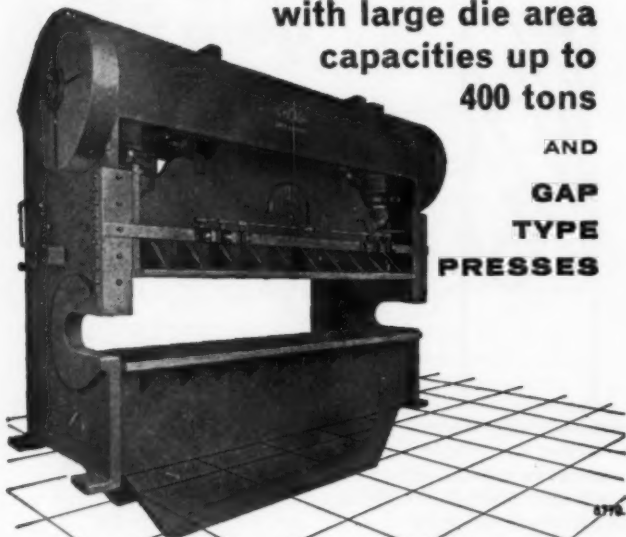
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STRAIGHT-SIDE TYPE

with large die area  
capacities up to  
400 tons

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GAP  
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Press Brakes • Straight-Side-Type Presses • Press Brake Dies  
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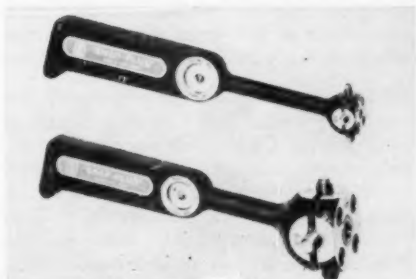
1½" to 8", and thickness from ½" to 1¼".

Ohio Knife Co., Dept. D, Cincinnati 23, Ohio.

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An adjustable internal plug gage in ranges of 1" to 4" can check both "GO" and "NO GO" with one insertion of

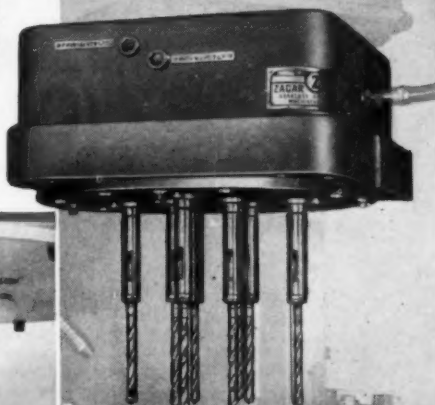
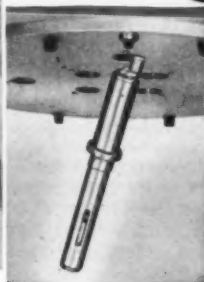


## NEW NEW Slip Spindles

ON  
ZAGAR  
HEADS

for  
drilling,  
reaming,  
tapping

Spindle locations can be changed quickly, easily, on Zagar gearless heads. Rigidity is retained in a compact, low height head. Varying patterns can be economically machined with one head, adaptable to any standard drill press.



A minimum of spindle extension keeps head height down.

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INCORPORATED

USE MORE SPINDLES TO DO MORE WORK

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the gage into the workpiece. A simple movement of the wrist upward denotes whether the part is in size or oversize.

The snap-plug design eliminates the need for many individual cylindrical plug gages. Conditions such as taper, bell mouth, and out-of-roundness can be readily detected. The cast aluminum frame is lightweight and durable. Gage pins are interchangeable and replaceable carbide tipped pins are available.

A complete kit contains a handle, sixteen gage pins, a micrometer-type centralizing gage, an adjustment wrench, and complete setting and operating instructions.

Southern Gage Co., Erin, Tenn.

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### Air-Cushioned Spindle Bearing

An improved air-cushioned spindle bearing is now standard equipment for



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RPM EASY—  
IMMEDIATELY—  
ELECTRONICALLY!**

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Pioneer Photo  
TACHOMETER.**

**COMPLETELY  
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Press the button, aim the beam, read the speed . . . that's how easy and fast RPM measurement is with the new Pioneer Photo Tachometer. Ideal for use on lathes, drills, presses, drives and wheels. Operates electronically, with no wires or mechanical connections. Send for free bulletin.



**THE PIONEER ELECTRIC & RESEARCH CORP.**

Subsidiary of Penn Controls, Inc.

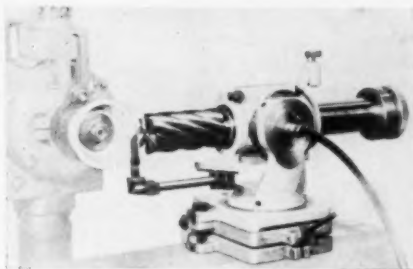
729 Circle Avenue

Forest Park, Illinois

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a universal cutter grinding fixture unit. This air-cushioned bearing reduces friction by eliminating metal-to-metal contact and produces a smooth, effortless grinding motion resulting in longer tool life, smoother finished surfaces, and increased sharpening speeds. The spindle bearing and the spindle do not have to be changed when used for air cushion operation.

Rocheleau Tool and Die Co., Inc.,  
Leominster, Mass.



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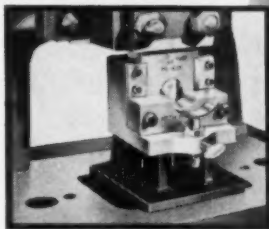
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## PIPE ENDS per MINUTE

with **ARC-FIT®**



Mounted in hand press with portable stand.



Complete unit with adapter mounted in punch press.

### ARC-FIT notching makes perfect joints for welding or brazing.

The Arc-Fit cuts clean contours for "T" joints in seconds . . . without deformation . . . no finishing is required. Mounted in hand or power press it readily notches 12 pipe ends per minute . . . 750 per hour.

A standard Arc-Fit with easily interchangeable dies (one for each contour) notches pipe ranging up to 2" O.D.; or tubing up to 2 1/4" O.D. Special Arc-Fits are available for larger sizes, angles other than 90°, slotting, notching square pipe and for angle iron or flat stock.

Pipe, tubing and shapes notched with Arc-Fit units.



**VOGEL**

Ask for literature. For quotation send sample or drawing of part.

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## Engineering Drafting Machine Now Tape Controlled

A tape-controlled engineering machine for drafting, lofting, scribing, plotting, and production tape verification has been designed to facilitate total use of mathematical formulae previously prepared for use in the processing of control tapes for production machine tools.

The control system will accept the coordinate description of any product, the shape of which can be mathematically defined, that has been prepared and coded on punched tape by a digital computer and peripheral equipment, and the machine will accurately prepare an engineering drawing of such a part or assembly up to 60" x 144" in size in a continuous operation.

 <b>Severance ELECTRODE DRESSING CUTTERS</b> Used by many to re-condition Electrodes without removing from machines— Down-time is Slashed! Production is Increased! Designed to fit most all popular Electrode Dresser power tools. Special shapes quickly made up. <b>INVESTIGATE!</b> It may pay you much! ASK FOR MORE INFORMATION TODAY!			<b>MIDGET MILLS</b> 
			<b>CHATTERLESS COUNTERSINKS</b> 
			<b>BALL SEAT REAMERS</b> 
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<b>Severance TOOL INDUSTRIES INC.</b> 722 IOWA AVENUE SAGINAW, MICHIGAN			<b>REGRINDING SERVICE</b> 

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It can produce solid or broken lines on standard types of drawing materials, such as vellum, glass cloth, and the like, with drawing instruments, and scribe metallic or plastic coated surfaces with scribing tools in the X-Y plane. Provision can also be made for producing drawings and plots in the X-Z and Y-Z planes.

Verification of tapes prepared for use on production machine tools can be made before such tapes are released to production, thereby saving a great deal of time and eliminating possible scrapping of parts due to a programming error.

Ekstrom, Carlson & Co., 1400 Railroad Ave., Rockford, Ill.

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# TORIT

## DUST COLLECTORS

*now by test . . . proof of*

### HIGH FILTERING EFFICIENCY

Under the most demanding of all filter tests, Torit Cloth Filter Dust Collectors have performed superbly. The testing device—a homogeneous aerosol generator capable of producing uniform sub-micron particles as fine as .05 microns (1/500,000 inch) and as coarse as 15.0 microns—was recently developed by Dr. K. T. Whitby, leading authority on particle technology.

For the first time, tests using such uniform particles indicate fractional efficiency based on particle count . . . the most exacting filter efficiency test ever devised. How did the Torit Dust Collector measure up in this test? Fractional efficiency when loaded with fine dust ranged from 96% at 0.1 micron to 99.99% at 2.5 microns; and after shaking 10 times, from 88% at 0.1 microns to 99.93% at 2.5 microns.

Such dust collecting efficiency may be just the solution to your dust problems. Torit Dust Collectors install everywhere and they belong everywhere dust is a problem.

#### WRITE FOR COMPLETE REPORT

*Dr. K. T. Whitby's Technical Report on the "Fractional Efficiency Characteristics of a Torit Unit Type Cloth Collector" is now available. Write*



### TORIT MANUFACTURING CO.

1133 Rankin Street, St. Paul 16, Minnesota, • Dept. 643

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### Water Cooler Baffle

A triple capacity water cooler baffle has been designed to handle a great volume of water for cooling hot spots on larger dies.

Called the Type B-4 cooling baffle, this unit is die cast with an additional heavy copper plating. The complete baffle consists of a 2" long casting with inlet and outlet ports, a 2" nipple, and

a 10" pipe which takes the coolant on the inside and returns it on the outside, back through the nipple and out the outlet port of the casting. Nipple and pipe are removable and reusable.

Water capacity is controlled by outside faucet or valve.

Richards Tool & Mold Co., Racine, Wisconsin.

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## What's Your Toughest Surface Measurement Problem—

- ☐ Measuring roughness of parts that are
- |   |  |
|---|--|
| <input type="checkbox"/> Extra-smooth?      | <input type="checkbox"/> Inside small ID's?      |
| <input type="checkbox"/> Short or narrow?   | <input type="checkbox"/> Remotely located?       |
| <input type="checkbox"/> Concave or convex? | <input type="checkbox"/> Of critical importance? |
- ☐ Measuring height and width of waves, bows, steps and other widely-spaced irregularities?
- ☐ Measuring individual pits, flaws, scratches?
- ☐ Measuring waviness around surfaces of rotation?
- ☐ Other: \_\_\_\_\_

Check and return this, and we'll send free literature on standard or special **Profilometer®**, **Proficorder®**, **Microcorder®** or **Wavometer®** equipment for the job.

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COMPANY \_\_\_\_\_ DEPT. \_\_\_\_\_

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**MICROMETRICAL  
MANUFACTURING COMPANY**

A SUBSIDIARY OF THE BENDIX CORPORATION

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### Solid Carbide Reamers

Two series of solid carbide four-flute reamers are available in Series 9164, eight fractional sizes from 1/64" through 1/8" in diameter; and in Series 9158, decimal sizes ranging from .0151 through .115.

Called micro reamers, these precision ground tools have diameter tolerances of .0001" to .0003".

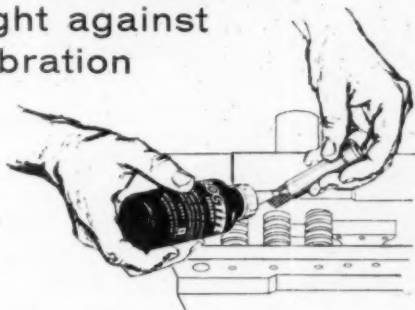
Recommended for all materials including steels up to Rc 56, they have been application tested on abrasive plastics, synthetics, fibers and exotic alloys. These tools can also be used for close tolerance reaming on electronic circuit board and instrumentation production.

The Atrax Co., Newington 11, Conn.

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stripper bolts  
tight against  
vibration



Loctite, a penetrating liquid resin that hardens automatically when confined between closely fitted metal parts, *locks* threads of cap and shoulder screws in place . . . holds them *secure* against all shock and vibration in your press tools. And parts treated with Loctite can be removed with ordinary tools.

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for literature and free sample.

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AMERICAN SEALANTS COMPANY

455 North Mountain Road, Hartford 11, Connecticut

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### Agglomerated Welding Flux

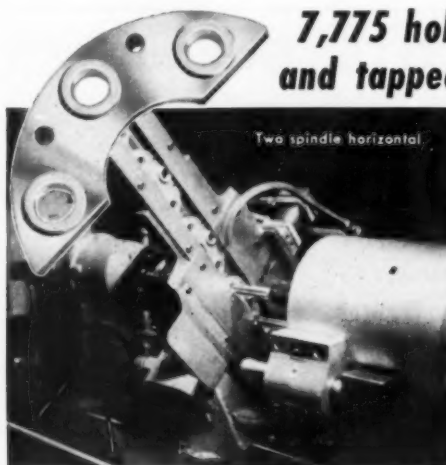
An agglomerated alloy flux for submerged arc fabricating or rebuilding 12 to 15% manganese steel parts offers maintenance cost economy in surfacing or reclaiming manganese or carbon steel parts by reducing material costs and increasing deposition rates and welding speeds.

Physical properties of weld metal deposits produced with this Lincoln-

weld M-210 flux demonstrate a yield strength of 64,400 psi, an ultimate strength of 107,500 psi, and an elongation in 2" of 35%. Typical deposition rates of semi or full automatic single electrode submerged arc welding equipment at a 350 amp. dc setting is 16.2 lbs. of weld metal per hour at a 100% operating factor.


This M-210 is particularly suited for joining manganese to manganese or

**7,775 holes reamed  
and tapped per hour**

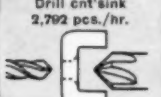


Two spindle horizontal

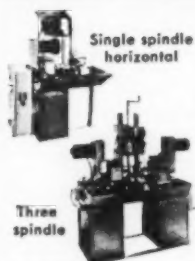

Tap #6-32  
7,175 pcs./hr.



Drill cnt's sink  
2,792 pcs./hr.



Drill 4 holes  
1,876 pcs./hr.



### U-A MACHINES GUARANTEE LOWER PRODUCTION COSTS OF SECONDARY OPERATIONS

You bet it's a strong statement. Yet, here's what some of our users have told us.

"Our U-A machines save us so much time that we'll pay for this equipment in six months."

"Really speeds up production and lowers overhead."

"Exceeds our wildest production dreams."

Beat the high cost, low profit squeeze, use U-A equipment. Before you "Do-it-Yourself" we'll be happy to furnish a firm proposal for cost comparison.

See all the U-A machines today, send for catalog.

### UNIVERSAL-AUTOMATIC CORP.

9545 Ainslie Street, Schiller Park, Ill. (Chicago Suburb)

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manganese to carbon steel. Typical applications include the composite joining of manganese steel castings or forgings to a low cost carbon steel framework, or reclaiming worn carbon or manganese steel surfaces through the welded addition of suitably shaped manganese steel bars or other sections.

The Lincoln Electric Co., Cleveland 17, Ohio.

Use postpaid card. Circle No. 125

### Height Setting Instruments

"Hite-Mikes," furnished with a 1" micrometer head, a 1" dial indicator, or a 1/2" dial indicator, are available for establishing and transferring heights or for measuring and checking size.

Units consist of a 1" high base with chrome plated and lapped top surface, and three lapped pads on the underside.

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***BENDING CAN COST YOU LESS...***



RIGHT HAND BENDING      LEFT HAND BENDING

### on the PINES INVERTIBLE ROTARY BENDER

***Fast Changeover — Accurate Bends***

Eliminate workpiece interference on jobs with multiple planes, odd shapes in tubing, bar, pipe, angles, rolled or extruded parts. Pivoting top assembly and interchangeable tooling on the Model 1400 provides fast, 2-minute conversion from clockwise to counterclockwise bending.

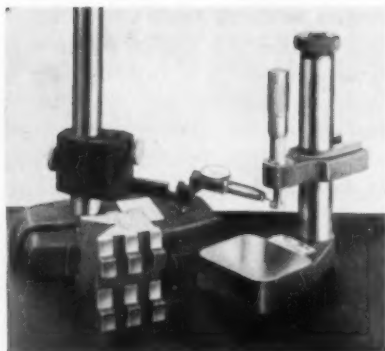
Producing quality bends at speeds up to 400 an hour in materials to 1 1/4", with angle accuracy to  $\pm 1/2^\circ$ , this highly versatile, low-priced, machine can cut your bending costs.

WRITE TODAY FOR CATALOG 356

**PINES** ENGINEERING CO., INC.  
Specialists in Tube Fabricating Machinery 690 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

Use postpaid card. Circle No. 337



A 6" high column holds 5" tubular stainless steel gage blocks.

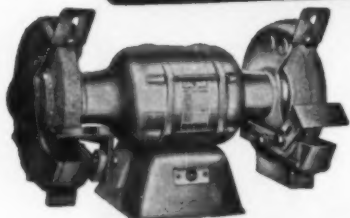
The micrometer head or dial indicators are held in a 1" thick yoke which can be inserted over any block on the column and positioned through 360°. Yoke slides are 2" long to permit optimum clearance for work and tool.

These instruments are self-checking, using either the base working surface or a surface plate for zero reference.

Brown & Sharpe Mfg. Co., Industrial Products Division, Providence 1, R. I.

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## MOST *Value-Packed* GRINDER MADE!



**only \$112<sup>00</sup>**

### CARBIDE TOOL GRINDER



Model 153-6". Reversible 1/2 HP motor, 3450 RPM. 1 1/2" wide wheels. Every part oversize for rugged, long-lasting use. Just \$201.80

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## MODEL 153-8"

Feature for feature, no other grinder offers so much for so little. Compare HP rating, wheel size, shaft diameter, bearing size with any other similar-type grinder. You'll quickly see why you get *more* with *Baldor*!

- Big 1/2 HP motor; won't burnout even if repeatedly overloaded!
- Wide-clearance design provides maximum working room!
- Large 8" first grade wheels!
- Heavier 3/4" arbor; larger ball-bearings!
- Dynamically-balanced rotor—extra smooth operation!
- Exhaust-type guards!

Write today for Bulletin 321N on complete line of Baldor Grinders and Buffers!

## BALDOR ELECTRIC CO.

4353 DUNCAN AVE.

ST. LOUIS 10, MO.

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### Lapping Compound Additive

An additive developed to extend the life of Trulap lapping compound, evenly disperses small particles of diamond dust throughout the compound and maintains a high degree of activity among the surface particles. Called Granulaide, it keeps the compound from drying or draining away, yet eases

the cleaning phases of the lapping operation.

The diamond particles are uniform, blocky shapes for an even cutting-polishing action. There are no spears or blades to scratch the work.

Wheel Trueing Tool Co., 3200 W. Davison, Detroit 38, Mich.

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# MILL

## KEYSEATS OIL GROOVES

QUICKLY — INEXPENSIVELY  
IN SOLID OR LAMINATED  
METALS AND PLASTICS

**NATIONAL** KEYSEATING OR OIL GROOVING MILLERS—when chucked in a drill press or radial, mill accurate keyways, oil grooves or slots in one pass of the miller through the bore of work piece.

**NATIONAL** millers are also designed for milling in BLIND holes. They can be indexed for milling opposite or multiple splines.

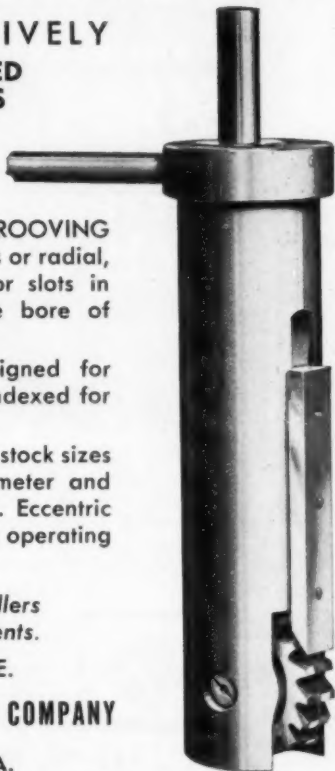
**NATIONAL** millers are available in stock sizes for bores from  $\frac{1}{2}$ " to  $3\frac{1}{2}$ " in diameter and with cutter widths from  $\frac{3}{32}$ " to 1". Eccentric bushings are available to increase the operating range of each miller.

*Keyseating or Oilgrooving Millers  
built to your special requirements.*

WRITE FOR FREE BROCHURE.

**NATIONAL MACHINE TOOL COMPANY**

P.O. Box 25122  
CINCINNATI 25, OHIO, U.S.A.



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### Broach Assures Concentricity On Diameters of Gears

A broach design concept has been developed to assure precision concentricity relationship between the I.D. and the pitch diameter of internal gears or splines.

Called the Red Ring concentricity broach, the tool is made up of a roughing broach with a removable finishing

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**CLEARLY...**  
CHANGE TYPE  
**FASTER...**  
with  
**MATTHEWS  
CHAMPION**  
STEEL TYPE  
HOLDER



Sturdily built, perfectly balanced, the Matthews Champion Steel Type Holder insures perfectly aligned, clear cut marking. Type changes are fast and easy, with the patented Matthews spring clip assembly. Type faces are precision-engraved on highest quality alloy tool steels.

Write for Bulletin 146-A29



**MATTHEWS  
MARKING  
PRODUCTS**

**JAS. H. MATTHEWS & CO.**

3946 Forbes Ave.

Pittsburgh 13, Pa.

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shell on the end of the broach. The shell has alternate round and spline finishing sections.

The teeth on the shell are full involute form and apply principles of full-form finishing. The round sections that finish the I.D. of the teeth are all full circle and are precision ground by the manufacturer in precision relationship to the teeth.

This concentricity broach shaves the tooth profiles to proper form and size while the I.D. of the part is being broached to size. This simultaneous cutting action avoids production problems encountered with conventional one-piece spline broaches.

National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich.

Use postpaid card. Circle No. 128

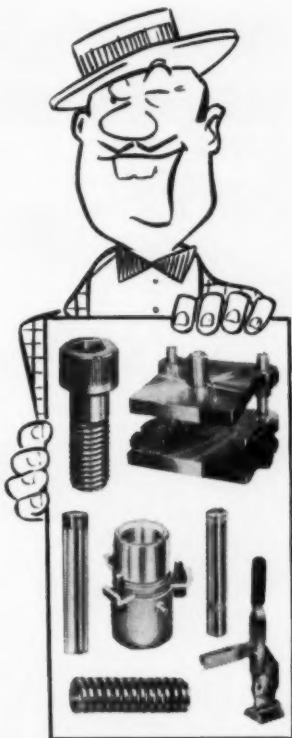
**LEMME TELL YA  
ALL ABOUT**



## **DIEMAKERS' SUPPLIES**

New 16-page booklet tells you all about Danly's complete line of precision diemakers' supplies. Shows the full array of bushings, guide posts, dowel pins, die springs, screws, toggle clamps—and everything else a diemaker needs.

Your Danly Salesman or distributor has a free copy of this helpful, fact-filled and sprightly written booklet for you. Ask him—or write us.



**MECHANICAL PRESSES — DIE SETS — DIEMAKERS' SUPPLIES  
HYDRAULIC METALWORKING EQUIPMENT**

# **DANLY**

**DANLY MACHINE SPECIALTIES, INC.  
2100 South Laramie Ave., Chicago 50, Illinois**

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### Hydraulic Checking Cylinder

A hydraulic checking cylinder, designated as Series S, has been designed to work with any suitable air cylinder. The Series S smooths out stroke speed variations and provides dial-set speed control at any desired stroke speed from 3 to 300 ipm. Maximum checking capacity is 1000 lbs. on the out stroke, with free return.

Construction features include chrome

plated steel piston rod with wrench flats, built-in rod wipers with automatic compensation for wear, and refillable oil reservoir with a visual low signal built in.

It is available in standard checking stroke lengths through 18", or longer stroke lengths on order.

Modernair Corp., 400 Preda St., San Leandro, Calif.

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## *NOW... big machine quality in an economy priced compact band saw*



Use it as a horizontal cut-off machine.



Use it as an upright band saw.

### THE NEW WELLS MODEL 300 METAL CUTTING BAND SAW

Would you like to make your metal cut-off jobs easier and more efficient? Would you like to be able to cut angles, slots, notches and bevels in the same machine?

You can do all of this with the new economical-to-buy and economical-to-use Wells Model 300 Metal Cutting Band Saw. Just check these features:

- $3\frac{1}{2}$ " x 6" capacity ( $3\frac{1}{2}$ " dia., rounds)
- Selective speeds of 54, 100, 190 ft. per min.
- Gravity feed and automatic shut-off for cut-off work
- Exceptionally rigid construction
- Well guarded—blade can be changed without removing guard
- Optional wheels and handle for complete mobility

Get full details on this remarkable value from your Wellsaw Representative or write for Bulletin No. 230.

Wells

SAW SPECIALISTS SINCE 1925

WELLS MANUFACTURING CORP.

707 Coolidge Ave. • Three Rivers, Mich.

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61-1A

### Diamond Abrasive Compound

A diamond abrasive compound features virgin diamond compound particle sizes that are laboratory controlled. The vehicle is a new homogeneous formula with a maximum of sharp cutting edges. It is also completely water soluble. Compounds are available in standard micron and mesh sizes, and are uniform and positively identified by color and

number for uniform performance. No mixing, stirring, special tools or skills are required as it is ready to use. The compound is packaged in tubes, disposable syringes, small or large cartridges, or jars.

Blue Streak Diamond Co., Inc., 36855 Schoolcraft Rd., Livonia, Mich.

Use postpaid card. Circle No. 130

## Two Hardness Testers in a Single Instrument

The new Wilson Rockwell TwinTester combines in one instrument the functions of both a Rockwell and a Rockwell superficial hardness tester. Designed primarily for use in such areas as tool departments, maintenance repair shops and laboratories, the TwinTester offers many outstanding features.

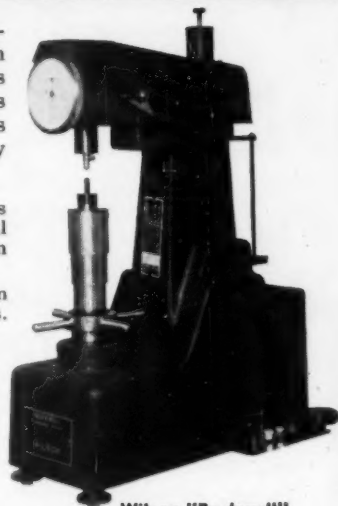
**Large direct-reading dial** is marked with B and C scales for Rockwell hardness, and N and T scales for superficial Rockwell hardness readings. Just one zero set position for all scales.

**Easy to operate**, the TwinTester can be changed from Rockwell to Rockwell superficial testing in seconds.

**Complete equipment** includes cowl, ball penetrator for B and T scales, Rockwell test blocks, anvils, dust cover and protective sleeve set.

**A complete line** of Wilson Rockwell instruments is available, including semi and fully automatic models. Wilson "Brale" Diamond Penetrators assure perfect readings every time.

**Write for details**—Ask for Catalog RT-58. It gives complete information on the TwinTester as well as on the full line of Wilson Rockwell hardness testers.



Wilson "Rockwell"  
TwinTester

# WILSON "ROCKWELL" HARDNESS TESTERS

Wilson Mechanical Instrument Division  
American Chain & Cable Company, Inc.

230-T Park Avenue, New York 17, New York

Use postpaid card. Circle No. 343



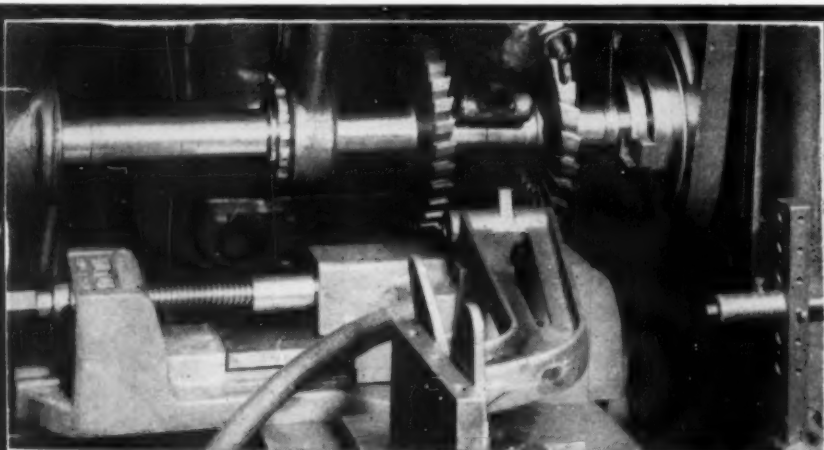
### Air Vacuum Cleaning Brush

A long-stem miniature brush is suitable equally for air pressure or vacuum cleaning. Called the "Minivac," it is used for cleaning minute particles of foreign matter from intricate mechanisms, such as electronic components. The narrow stem is 6" long and bent to a 45° angle, 1" from the end to which the brush head is attached, thereby

enabling the operator to reach areas that otherwise would be inaccessible.

The brush consists of a hollow brass stem threaded at one end and a brass head containing nylon bristles which is threaded to fit the stem. When the nylon bristles become worn, the head is removed and discarded and a new head is inserted.

Nylon bristles, available in either 1"



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**MILOMATIC's CONVERSION FEATURE CUTS TOOLING COSTS . . .**

Wilton Milomatics fill a definite industrial need for a power machine vise that can easily be converted into a *fully automatic production* fixture. Advantages of both air and oil are combined for fast, controlled locking force . . . the resulting faster reload operations save time and production costs. Low design allows use on variety of jobs. Write for more information.

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or  $\frac{1}{2}$ " trim sizes, surround the brush head orifice and do not block the passage of air or vacuum. Pliable bristles loosen the particles and they are either drawn through the stem by suction or removed by air pressure.

Weiler Brush Co., Inc., 2115 Lake Front Lane, Cresco, Pa.

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### Electronic Gaging Systems

A line of electronic gaging apparatus has been designed to eliminate errors in reading and recording and to permit new flexibility in gaging. One machine, for example, reads out twenty-four different gage points, showing the location and the variation in lighted

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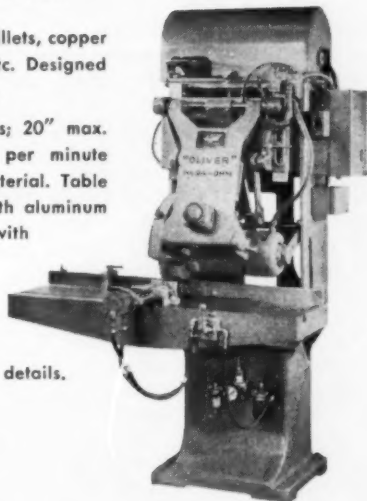
## "OLIVER" No. 94-DHM HYDRAULIC CUT-OFF SAW

*Cuts nonferrous metals  
without burr and at a  
high rate of production*

For aluminum extrusions, billets, copper and brass bars, tubing, etc. Designed for precision performance.

Saws: 14" std. for 3" cuts; 20" max. for 6" cuts. Stroke: 28 per minute maximum for 6" wide material. Table is cast iron 15" x 48" with aluminum throat plate and opening with chute for automatic removal of pieces up to 6" long.

Write for full technical details.



**OLIVER MACHINERY COMPANY**  
GRAND RAPIDS 2, MICHIGAN

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numerals 1" high. It then prints this information on a paper tape.

The systems make use of sensitive transducers that substitute for standard dial indicators and most air probes in any mechanical design gage. The small size of these probes ( $\frac{3}{16}$ " diameter x 2-13/32") and their flexible connecting wires allow check points where never possible before, and is particularly valuable in gaging the interior of hollow parts.

The Model CS-24 console (shown) reads out as many as twenty-four probes, either individually, when the proper button is touched, or automatically in sequence. Each gage location and the variation from nominal part dimension is shown in lighted numbers in the readout windows, eliminating common operator errors of judgment and parallax. The machine can also print a permanent record on tape, cards, or stickers.

This CS-24 also reads the variation in nominal part thickness between any two opposed probes. The console can be used with any number of different design gages, moving from one to another with no delay except setup.

Winslow Mfg. Co., 1751 E. 23rd St., Cleveland 14, Ohio.

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### Precision Spur Gear Racks

A complete line of certified precision spur gear racks is now offered from stock in 24 to 96 diametral pitch sizes.

Manufactured from No. 416 stainless steel under controlled stress relieving procedures before final cutting, the racks are subject to minimum distortion or growth to shelf-life or temperature variations. Rack dimensions are certified at final inspection, and a complete inspection report is supplied with every rack.

Standard 11" lengths, precision ground on all sides, are available in three classifications. With ends ground to  $\frac{1}{2}$  linear pitch, racks can be butted where greater lengths are required.

PIC Design Corp., 477 Atlantic Ave., East Rockaway, Long Island, N.Y.

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### Drill Speeder

A drill speeder, with a ratio of 6.25 to 1 and a capacity from No. 80 to  $\frac{1}{8}$ ", permits quick and easy installation on all types of drilling machines. It can be used in manual, semi-, or completely automated operations on all types of drilling machines. Recommended spindle speeds of from 1200 to 3200 rpm will produce maximum drilling speeds up to 20,000 rpm.

Tapmatic Corp., 845 W. 16th St., Costa Mesa, Calif.

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## ELGIN Ultra-Universal Tool & Cutter GRINDER

Model AUL500

8" x 20" cc

Capacity

**\$3,940**



complete with  
standard  
equipment incl.  
Square "D"  
Electrics

A jewel of a  
machine — no limit  
to the type and range of tools  
it can handle. With patented  
6-way swivelling head and  
double-swivelling table.

**IMMEDIATE DELIVERY FROM STOCK!**

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Precision built to  
meet every require-  
ment. Carroll Di-  
viding Heads are the as-  
cepted standard in metal-  
working plants from coast  
to coast.

A unique optional swivel  
base makes possible  
speedy and accurate work  
settings to compound  
angles. This and other  
features convert a con-  
ventional Dividing Head  
into a Universal Work  
Head or Rotary Table.

Write for 8 page catalog  
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10" — 12" Universal  
Right of Left Hand  
Dividing Heads with or with-  
out Direct Indexing.

**CARROLL DIVIDING HEAD CO.**

3525 Cardiff Ave. • Cincinnati 5, Ohio

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# WOHLHAUPTER Masterheads

BORING — TURNING — RECESSING — UNDERCUTTING — TAPER CUTTING

## FEATURE

- ★ Automatic Feeds and End Release
- ★ 9 Sizes to 36 1/4"
- ★ 12 Feeds in 0.0008" Increments
- ★ Increase the capacity of any machine without facing facilities.

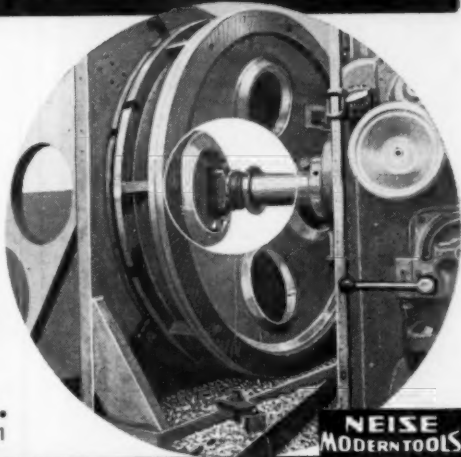
**WRITE FOR COMPLETE CATALOG**

Final boring of Polaris Missile nozzle bosses  
by Wohlhaupter UPA 556 on DeVlieg Jigmill  
—Photo courtesy Aerojet-General Corp.

Sole U. S. Representative

**KARL A. NEISE, INC.**

402 4th Ave., New York 16, N.Y.—MU 3-0481



**NEISE  
MODERN TOOLS**

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### Modern NYLON Drill Saver CUTS DRILLING COSTS AS MUCH AS 25%

Now . . . the amazing toughness of nylon applied to drill sleeves! Far more economical initially . . . drastically cuts replacement costs . . . prolongs drill life. Available for taper shank drills and reamers.

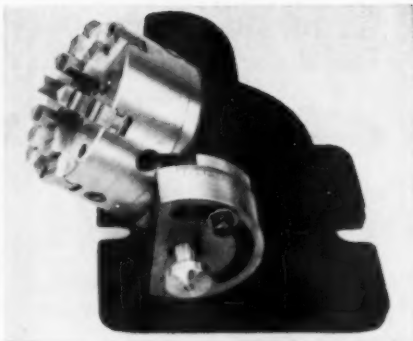
ENGINEERED AND MANUFACTURED UNDER PATENT NO. 2879069  
BY RICK, INC., ERIE, PA.

AMERICAN TWIST  
DRILL CO.  
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MFG. CO.  
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STANDARD TOOL CO.  
THREADWELL TAP &  
DIE CO.  
UNION-CARD DIVISION,  
UNION TWIST DRILL CO.

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### Universal Indexer

A universal indexer accommodates either a Buck 4" chuck or standard 5C collets, and is designed for use in tool-rooms, as well as on production lines. In addition to providing an ideal work holding fixture for milling, drilling, and grinding operations, it is suitable for layout work, such as locating holes and scribing lines, angles, and degrees.

Features include facilities for quick interchange of chuck or collet, and head angle through an arc to 90°. Spindle rotates 360° and can be quickly indexed and locked in positive position by a spring-loaded pin against a spacer indexing ring.

A 24-position space ring is included



with the standard unit. Other spacer rings are available for numerous combinations and can be quickly changed.

Kalamazoo Industries, Inc., Box 2558, Kalamazoo, Mich.

Use postpaid card. Circle No. 135

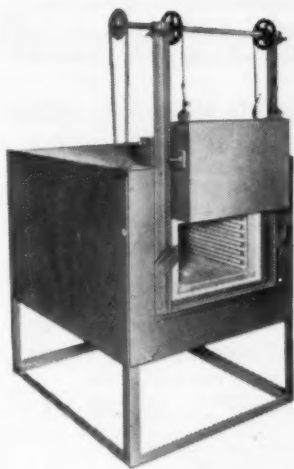
### Oiler For Coiled Stock

A coiled stock oiler introduces a new concept for cleaning and depositing a controlled film of cutting oil on the top and bottom surfaces of coiled stock before it enters the punch press dies. Oil is fed to the core of a pair of rollers and the flow is controlled to each roller by adjustable needle valves. Thus a uniform film of cutting oil is maintained. The stock is wiped clean by a pair of squeegees as it enters the oiler.

The oiler is capable of handling coiled stock up to 3" wide and 1/16" thick. Its oil supply is contained in a plastic bottle which can be refilled in seconds. Because there is no open reservoir, wasted cutting oil due to excess lubrication or spillage is eliminated.

Jaco Devices, Inc., 99 High St., Hingham, Mass.

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Originally designed to meet U.S. Air Force specifications (ninety-four furnaces have been delivered to date), the Lucifer 5055 Series furnaces are used for hardening, annealing, drawing and preheating applications . . . 2,000°F. and 2,300°F. This series is available in five standard models built for heavy use. All standard models include . . . an automatic controller, thermocouple, lead wire and magnetic contactor, vertical lift door, cast hearth plate, low watt density metallic elements mounted in our exclusive one piece monolithic holders, welded heavy steel plate reinforced casing, highest quality insulation brick throughout.

For further information, a complete catalog or engineering advice . . . write, wire or call . . .

### LUCIFER FURNACES, INC.

Neshaminy 1, Pennsylvania  
Diamond 3-0411

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**HARDENING • ANNEALING • DRAWING • PREHEATING FURNACE**

## A CONTROLLED BLOW

Saves TIME, EFFORT and MONEY

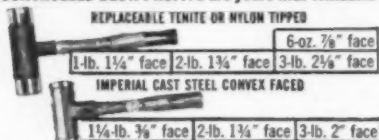
### TAHLEN NO-BOUNCE HAMMERS

Prove, in your own plant, why this imitated, but never equalled hammer has saved millions of man-hours for its users.

Plastic tipped TAHLENS have all the advantages of lead hammers but none of their faults. No flying fragments, no distorted faces that cause misplaced blows.

And for fastening and drilling, Cast Steel TAHLENS with their high impact, replace mauls twice as heavy—save time and energy.

#### CONTROLLED BLOW PROFITS are yours with TAHLENS



REPLACEABLE TENITE OR NYLON TIPPED

6-oz. 7/8" face  
1-lb. 1 1/4" face 2-lb. 1 3/4" face 3-lb. 2 1/8" face

IMPERIAL CAST STEEL CONVEX FACED

1 1/4-lb. 3/8" face 2-lb. 1 1/4" face 3-lb. 2" face

Write for the Tahlen distributor in your area

Dept. B-12 **TAHLEN HAMMER CO.**

1214 Poplar Place So., Seattle 44, Wash.

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### another VICTOR value!

#### DIAMOND WHEEL DRESSERS

TOP QUALITY • LOWEST PRICES

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

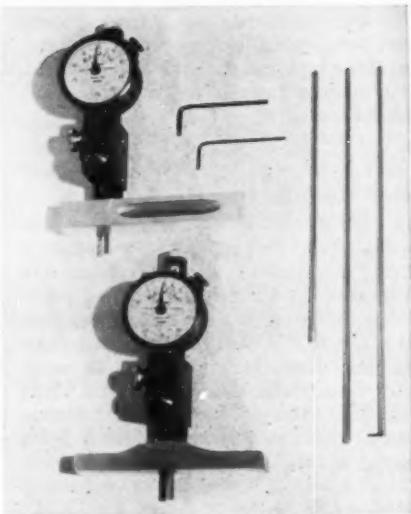
These diamonds can be set in any shank to your specifications for \$1.00 each extra.

Order Today—  
Immediate Shipment from Stock!

#### VICTOR MACHINERY EXCHANGE, INC.

Tool Room Equipment Since 1918  
DEPT. B, 251 CENTRE STREET  
NEW YORK 13, N.Y. • TEL. CAnel 6-5575

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#### Depth Gages

Boice Gages, Inc. is adding a line of adjustable depth and groove location

## SHORT RUN STAMPING VALUE!



Everything considered . . . accurate high quality stampings that meet your specs . . . prompt deliveries to fit your production schedules . . . and right prices to save you money . . . you get your biggest short run stamping value at FEDERAL! Three plants across the nation to serve you fast. Prompt personal attention to every order.

Send your prints today for quick airmail or phone quotations. Also ask for a free copy of "Money-saving tips for designing Short Run Stampings."



Federal Tool & Mfg. Co.  
3610 Alabama Avenue  
Minneapolis 16, Minn.  
WESt 9-7843

Federal Short Run Stamping Inc.  
910 Lyell Avenue  
Rochester 6, New York  
CLearwater 5-9523

Federal Stamping Co.  
7310 Atoll Avenue  
No. Hollywood, Calif.  
TRiangle 7-0542

Use postpaid card. Circle No. 352

MACHINE and TOOL BLUE BOOK

gages manufactured by its newly acquired subsidiary, Reliant Gages, Inc., Santa Maria, Calif. Model B-1500 is fully adjustable for a depth range 0 to 5¾". The gage is said to be more accurate and convenient than fixed-shank types for measuring depths of holes, slots, grooves, internal shoulders and recesses. Close tolerances can be checked rapidly without the necessity of counting dial revolutions.

The gage set includes gage body with a .0005" 0-25-0 dial indicator, one 4¼", one 6", and two 8" rods of .125" diameter. One 8" rod is straight; the other has a hardened foot for gaging grooves and recesses. A slide-action knurled push-button provides fast and easy means for setting and exchanging rods.

Model B-1600 is a lower priced dial depth gage for a 0 to 2" depth range.

Boice Gages, Inc., New Hyde Park, New York.

Use postpaid card. Circle No. 137

## NEW FLYNN

"60"  
SERIES

### OFFSET BORING HEADS

This new precision offset boring head is designed for ½" to 1" bar capacity. Features long, stocky tool block for securing the tool. Vernier simplifies close visual adjustment.

**INTERCHANGEABLE ARBORS AND SHANKS  
SAFETY ROUND CONTOURS**

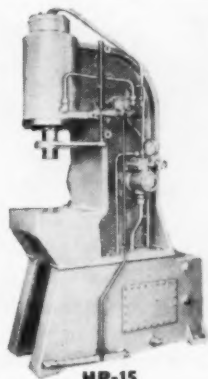
Complete Line of Boring Heads and Tools

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**FLYNN MANUFACTURING CO.**  
18301 WEAVER, DETROIT, MICHIGAN

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December, 1961



HP-15

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FROM 2 TO 50 TONS

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*Greenerd* ARBOR PRESS CO.

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Model WD-10 Wet  
or Dry 10" Carbide  
Tool Grinder.

HAMMOND Carbide Tool Grinders will soon pay for themselves through greater wheel economy, longer tool life and faster grinding.  
**AMERICA'S MOST COMPLETE LINE.**

Conventional and Electrolytic Carbide Tool and Chip Breaker Grinders.

WRITE FOR CATALOG

*Hammond Machinery Builders*

1614 DOUGLAS AVENUE, KALAMAZOO, MICH.

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### Transistorized Electronic Gages

A completely transistorized line of electronic gages capable of measuring physical dimensions as small as .000002, features a system of interchangeable precision measuring units. This includes two amplifiers, a choice of height gages, bench comparators, dice thickness gages, and the Minigage head. Small in size and light in weight these

units are available in both 110-volts, ac, or self-contained battery models.

Also included are the Surfmaster for measuring surface roughness, the Delcom metrology comparator, the Pulcom cylindrical grinder control, and the micro-checker for calibrating electrical and mechanical transducers.

Techni-Rite Electronics, Inc., 61 Centerville Road, Warwick, R.I.

Use postpaid card. Circle No. 138

### Needle Thrust Bearings

Needle thrust bearings with glass fiber-filled nylon separators are now available for off-the-shelf delivery.

Called Nyla-Rol NJ bearings, they employ a nylon separator that has less sliding friction, longer wearing properties, and higher operating speed than interchangeable sizes of all-steel needle thrust bearings. They are also lightweight and have nonmagnetic and noise dampening features.

Needle roller thickness has been

### JIG BORING MACHINE

accuracy to tenths on the new



### MODEL 1A LINLEY JIG BORER

Now, at moderate cost, a versatile, precision jig boring machine for small and large shops. Guaranteed lead screw accuracy to .0001 over the entire range. Designed for tool, die and model work; small precision jobs. New accessories add to its usefulness. Send for details.

Table Size: 7" x 17 1/2"

Table Travel: 6 1/2" x 10"

### LINLEY BROTHERS CO.

663 State St. Ext., Bridgeport 1, Conn.

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## Get the straight DOPE!

You can count on Tamms quality Blue Layout Dope. Won't chip, crack, or flake. Dries fast, highly oil resistant. Get the straight dope... get Tamms!



WRITE FOR  
SAMPLE!

## Tamms INDUSTRIES CO.

228 North La Salle Street, Chicago 1, Illinois

WHERE YOUR BUSINESS IS APPRECIATED!

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MACHINE and TOOL BLUE BOOK



standardized at .0781". The sizes available from stock have nominal I.D.'s of 1.114" and 1.255", and nominal O.D.'s of 1.800" and 1.917" respectively.

These bearings use high precision rollers made of SAE 50100 steel hardened to Rc 60. They are held to .0002" tolerance on diameter to insure uniform load distribution and maximum capacity.

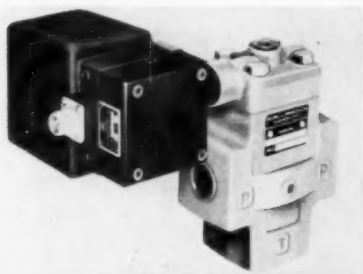
The Kaydon Engineering Corp., Muskegon, Mich.

Use postpaid card. Circle No. 139

### Motor-Actuated Relief Valve Has Two Pressure Settings

A 3/4" hydraulic relief valve, having two adjustable pressure settings, is a single pilot-operated relief valve that is controlled by an electric motor-driven actuator.

The two desired pressures are set by limit switches in the actuator. Settings



can be made for any pressure to 5000 psi. The settings are then selected by remote electrical control. The actuator motor (115V-ac) turns an eccentric cam that extends or retracts a plunger, which alters the compression of the relief valve control spring, thus changing the line pressure required to open the valve.

Double A Products Co., Manchester, Michigan.

Use postpaid card. Circle No. 140

surface  
harden  
TOOLS &  
PARTS  
without  
special  
equipment

### KASENIT COMPOUNDS

For use in tool rooms and machine shops, Kasenit is deep-penetrating, eliminates soft spots and warping. Absolutely safe, easy to use. Booklet B tells how these compounds can help you. Write now!

Available direct or from leading industrial distributors.

KASENIT CO. 12 KING ST., MAHWAH, N. J.

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### PRECISION TOOL MAKERS VISE

One piece construction  
H & G accurate within  
.0003. C' bored holes for  
special jaws. C' bored  
holes for clamping on sine  
plate or machine. Rapid  
ratchet type tightening.  
0-4" opening. Note size  
of vise. PRICE: \$85.00



SIZE: 0 1/2 x 3" wide  
Depth of Jaw 1 1/4"

No shipping charge if payment with order

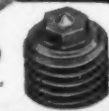
**HERMANN SCHMIDT**

P.O. BOX 223  
BLOOMFIELD, CONNECTICUT

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IN 11 SIZES—No. 6 to 1"  
N.C. In all S.A.E. sizes.



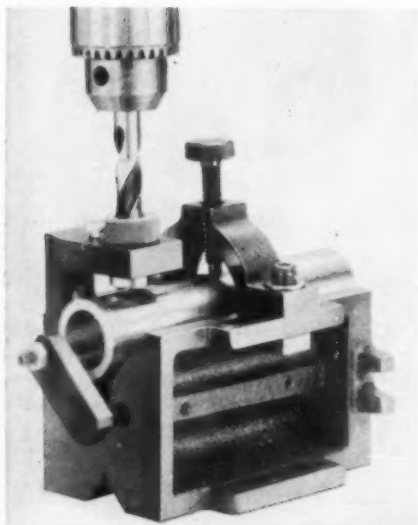
*You Need an Extra Hand Now  
to Speed Up Production!*

### HEIMMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

**HEIMMANN MFG. CO. • URBANA, OHIO**

Use postpaid card. Circle No. 360



### Multiple-Purpose Jig

A multiple-purpose jig, designed as a tool of many uses, automatically centers round or square stock for milling or drilling. This jig mounts either vertically or horizontally on drill presses, milling machines, or face plates of lathes. It can be used for cutting keyways, for straddle milling or slotting, and for eccentric turning and drilling. An adjustable stop is furnished for controlling the exact distance of the drilled hole from the end of the stock.

Every jig is equipped with three jig plate brackets fully machined from heavy one-piece castings and with lock screws and L-type liners of 5/16", 1/2", and 3/4" I.D. to accommodate American slip renewable or fixed renewable bushings in sizes of No. 80 through 9/16" I.D. range.

These bushings can be inserted for the individual hole size required. Back-

## BORING BAR

by  
**MODERN**

KILLS  
VIBRATION,  
CHATTER!



Scientifically designed to diminish vibration in boring, the MODERN boring bar has various size holes drilled from each end to minimize harmonic vibration. Hole diameters were determined by using a VIBRATION METER and probing bar every 1/4". The cavity is filled with shock absorbing material under vacuum, thus obtaining a dead bar of superior strength.

## MODERN

**MANUFACTURING CO., Inc.**  
680 Davisville Road, Willow Grove, Pa

Use postpaid card. Circle No. 361



TYPE 36-3  
COMPLETE KIT only **\$36.00**

F.O.B. Chicago  
All materials in spray cans — fire-safe. Includes: 4 cans Cleaner, 2 cans Penetrant, 2 cans Developer, cleaning brush, instructions — in rugged steel carrying case. Replacement materials available, ask for details. Price: Continental U.S.A. only and Hawaii—F.O.B. our plant, Chicago, Ill., plus local taxes.

Prevent Failures  
**FIND CRACKS or  
LEAKS FAST**

WITH LOW-COST

**Spotcheck**  
DYE PENETRANT INSPECTION

FOR SAFETY—find cracks before they cause accidents.

Check machines and parts—shafts, gears, pressure vessels, tanks, bolts and hooks, tools, supporting members, etc.—during overhaul or in routine maintenance.

Spray on Spotcheck Cleaner, Penetrant, Developer. Complete test takes just a few minutes per part—costs just a few pennies. Every dangerous defect pops out in bright red against white background, can't be overlooked. Be sure, with Spotcheck—a standard safety and maintenance test that is preventing downtime and loss, making operations safer in thousands of industrial plants.



ORDER FROM YOUR DISTRIBUTOR — or direct  
**MAGNAFLUX CORPORATION**  
A Subsidiary of General Mills  
7344 W. Alameda Avenue • Chicago 31, Illinois

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MACHINE and TOOL BLUE BOOK

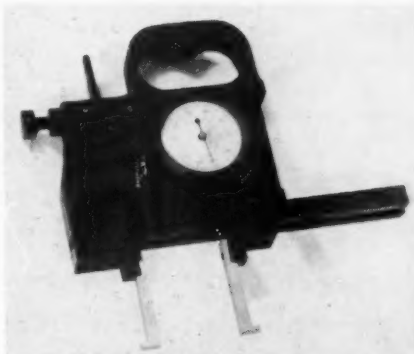
ets are reversible and can be used together for drilling different size I.D.'s at various lengths.

This Multi-A-Jig is milled from a high-tensile-strength ductile iron casting. Surfaces are machined to within .003".

The jig is 3" x 3" x 5", and holds 1/4" to 1" round stock on one side and 1" to 1 5/8" on the other.

American Drill Bushing Co., 5107 Pacific Blvd., Los Angeles 58, Calif.

Use postpaid card. Circle No. 141



This gage has an aluminum body with tips and other critical parts made from hardened and ground steel to assure long wear and accuracy. The indicator is nested into the gage body for protection.

Adam Tool Co., 50 E. 11th St., New York 3, N. Y.

Use postpaid card. Circle No. 142

### Dial Indicator Groove Gage

A dial indicator groove gage has been designed for production groove measurement of O-ring, snap-ring, and similar internal grooves. A unique feature is a set of extension arms which enables the same gage and same measuring tips to be used for grooves in deep bores and shallow holes.



### GEARS

In Stock—Immediate Delivery

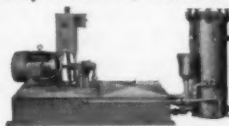
Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 18a  
**CHICAGO GEAR WORKS**  
440-50 N. Oakley Blvd., Chicago 12, Ill.

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### GUN DRILLING HYDRAULIC UNIT

Both high and low pressure pumps and tanks; proper G.P.M. for job. Large filter unit, 5 micron. Pushbutton station. Avey Division, Cincinnati 1, Ohio.



Use postpaid card. Circle No. 364

## BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool that Holds Work at Any Desired Angle.



Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

**Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding**

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Made in several stock sizes. Write today for full information.

**US AUTOMATIC BOX MACHINERY CO., Inc.**

10 ARBORETUM RD.  
BOSTON 31, MASS.

Use postpaid card. Circle No. 365



#### Thread P.D. Comparator

A thread pitch diameter comparator, combined with three-wire carriers, provides an accurate method of measuring thread pitch diameters with the accepted standard three-wire method.

The conventional hand held wires are placed in individual carriers for greater handling ease and longer life. Available in three sets, "N", "P", and "NQ", these carriers are designed for use on micrometers, measuring machines, and Standard P.D. comparator.

P.D. comparators can also be used to measure gear pitch diameters and regular O.D.'s with an adjustable range to 1-1/16".

Standard Gage Co., Inc., Poughkeepsie, N.Y.

Use postpaid card. Circle No. 143

#### Miniature End Mills

Miniature HSS end mills, all with uniform 3/16" shanks, ranging from 1/32" to 3/16", are now available. Used for milling straight slots, grooves, or intricate slots in dies, molds, tools, electrotypes, engravings, plastics, and plastic-metal laminates, they are suitable for general-purpose milling of all types of machinable material. The ten types include single- and double-end two-fluted ball end, single- and double-end two flute, and single-end four-flute mills in a choice of cupped-end or center cutting plunge type mills. HSS combination drills and countersinks are in three sizes, .020", .025", and 1/32" drill diameters, all having 1/8" body diameter.

Quality Tool Works, 322 S. Elmwood Ave., Waukegan, Ill.

Use postpaid card. Circle No. 145

#### Numerical Control Seminars

Numerical control, a revolutionary development in metalworking, will be explained at seminars across the country to be conducted jointly by the National Machine Tool Builders' Association and the American Machine Tool Distributors' Association, beginning in Los Angeles, Calif., at the Baltimore Hotel, Dec. 4 and 5.

Ten other seminars will be as follows:



#### SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—0025 undersize to facilitate use—Black oxide finish

Set No. 3-17, 28 punches with indexed stand—size 3/32" to 1/2" by 1/64"—plus handy 17/32" size, Length 4-7/8" ONLY \$19.40

Single sizes available

**R. L. SPELLMAN CO. - URBANA, OHIO**

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# The MARKET PLACE

Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. Rates \$20 per column inch per insertion. Maximum size advertisement accepted in this section is three inches.

Copy should reach us by the first of the month for next month's issue.

**MACHINE and TOOL BOOK** A Hitchcock Publication Wheaton, Ill.

San Francisco, Calif., Jack Tar Hotel, Dec. 7 and 8;  
St. Louis, Mo., Statler Hilton Hotel, Dec. 18 and 19;  
Cleveland, Ohio, Statler Hilton Hotel, Jan. 8 and 9;  
Cincinnati, Ohio, Netherlands Hilton Hotel, Jan. 11 and 12;  
Chicago, Ill., LaSalle Hotel, Jan. 22 and 23;  
Detroit, Mich., Sheraton-Cadillac Hotel, Jan. 25 and 26;  
Philadelphia, Pa., Marriott Motor Hotel, Feb. 5 and 6;  
Boston, Mass., Hotel Kenmore, Feb. 8 and 9;  
Atlanta, Ga., The Dinkler Plaza, Feb. 19 and 20; and  
Dallas, Tex., Hotel Adolphus, Feb. 22 and 23;

Both associations believe that numerical control is one of the most significant developments in metalworking in many years. While the course eliminates the mystery in numerical control, attention also will be given to the many new types of machine tools which can greatly increase productivity.

The course is designed especially for key executives in manufacturing firms, their engineers, production managers, and sales heads. However, builders and distributors of machine tools will also attend. For registration and applications for attendance, please write directly to the National Machine Tool Builders' Association, 2139 Wisconsin Ave., Washington 7, D. C.

## HEAVY DUTY DOVETAIL SLIDES

These slides are built to take steady use. All are fitted with tapered gibs. Available in 2, 3, 4, 5, 6 and 8 inch widths.

**Biddle Engineering Co.**  
P.O. Box 98 Warrendale, Pa.

## ARE YOU HAVING TROUBLE TAPPING TOUGH, BEARING BRONZE?

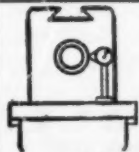
BRONZ-CUT No. 10 reduces cutting torque 17%. Produces better finish, less heat and less tool seizure. Free literature.

**Gordon R. Cedarleaf Co.**  
503 Westchester Dr. Rockford, Ill.

## EXTEND YOUR DIE LIFE

Eliminate Scuffing, Metal Pickup, by  
**CARBIDE COATING**  
.0005" Thick  
**ONE DAY SERVICE.**

**Howard A. Hayden**  
25205 Ryan Rd. Warren, Mich.  
SLecum 7-8262



—Tested Know-How  
& Show-How

## MACHINE TOOL RECONDITIONING

Send for free folder describing  
illustrated book featuring hand  
scraping methods (4th printing)

**Machine Tool Publications**  
215 Commerce Bldg.

East 4th Street St. Paul 1, Minn.

## APPOINTMENTS AND PROMOTIONS

### Personnel Changes . . . Executive and Production



H. H. Maltbie



J. D. Stank

Henry H. Maltbie has been named vice president and general manager of the Specialty Valve, Trap & Controls Division of White Sewing Machine

Corp., Cleveland, Ohio . . . Joseph D. Stank has been elected vice-president of The Ladendorf Co., Detroit, Mich. . . . Revere Copper and Brass Inc., New York, elected Edward S. Bunn vice-president . . . Frank L. Brandt has been appointed vice-president of the Lynn Division of Thomson Electric Welder Co., Inc., Lynn, Mass. . . .

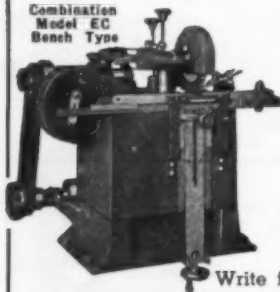
The DoALL Co., Des Plaines, Ill., announced the following promotions: William R. Matthiesen to president and district sales manager of the company's Toledo plant; Louie L. Etheridge to vice-president and general manager of

continued on page 232

### SHARPEN your own SAWS HACK, BAND AND CIRCULAR

Save 80% with Wardwell's "Save-a-Saw". Automatically sharpens saws

Combination  
Model EC  
Bench Type



with teeth as fine as 32 to inch. By sharpening only 2 gross of blades your saving will pay for the machine.

Write for literature.

**WARDWELL**  
MANUFACTURING CO.

3807 Ridge Road • Cleveland 9, Ohio

Use postpaid card. Circle No. 357

### REPLACE SOLID BUSHINGS with CIRCO-FLEX ADJUSTABLE BEARINGS



Cutaway View

#### CIRCO-FLEX "LIVE" BUSHINGS

- Increase Speeds, Feeds, 200%
- Reduce Tool Breakage
- Eliminate Bushing Wear
- Use Economical Carbide Cutters
- Provide Greater Precision
- Available for 1/2" to 6 1/2" Shafts
- Will stand greater sidewall pressures

Get time, tool, and money-saving advantages by replacing solid bushings with Circo-Flex adjustable roller bearing units. Available for 1/2" to 6" shafts or with straight roller bearings where space is a factor in 1/2" to 2" shaft size. Write for information.

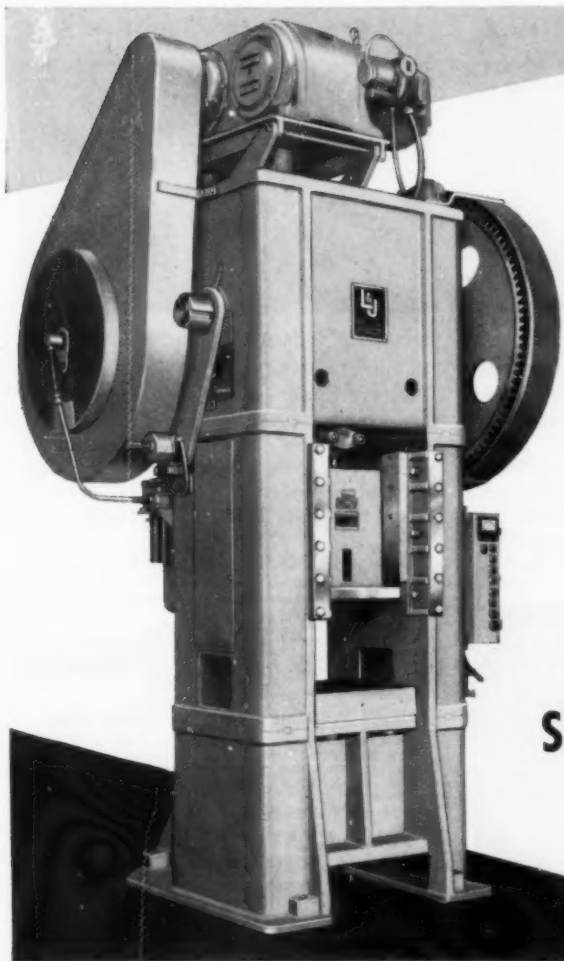
#### DONLEY PRODUCTS, INC.

Dept. MT-10 • 11106 Aven Ave. • Cleveland 5, Ohio

Use postpaid card. Circle No. 368

MACHINE and TOOL BLUE BOOK





***Accurate  
Efficient  
Dependable***



**SINGLE CRANK  
STRAIGHT SIDE  
PRESS**

**STANDARD EQUIPMENT**

Air clutch and brake. Four square type gibs with bronze surfaced ways on ram. Hard bronze crankshaft bushings and ball seat. Ram counter-balances. Forced lubrication, J.I.C. controls, etc.

**Write** — Bulletin L-18 on 20 to 150 ton single and double crank straight side presses... also, 30 to 75 ton gap frame presses.

- 150 ton capacity adaptable to many jobs.
- Plain flywheel or back geared type.
- 6½" dia. main bearings, 9" dia. crank pin.
- Dimensions of bed and ram face, stroke length and shut height available as required.
- Extra heavy box type steel weldment tie rod construction.
- Rigid, accurate for precision and long die life.

**L & J PRESS CORPORATION, 1625 Sterling Ave., Elkhart, Ind.**

Use postpaid card. Circle No. 369



**THIS MONTH** continued



I. J. Lubalin



F. C. DiLuzio



J. J. Meder



Malcolm Hunt

the Tennessee Company; and **Donald W. Mueller** to cutting tool product manager of the Des Plaines plant . . .

**Irwin J. Lubalin** has been named executive vice-president of Shaw Process Development Corp., Port Washington, N.Y. . . . **Frank C. DiLuzio** has been named vice-president of engineering at the Fairbanks, Morse & Co.'s

Beloit Group, Beloit, Wis. . . . **H. L. Stewart** has been appointed vice-president and sales manager of Logansport Machine Co., Inc., Logansport, Ind. . . . **John R. Baker** was named general manager of the Manufacturing Division of MB Electronics, New Haven, Conn. . . .

**Joseph J. Meder** was named manager

## JIG GRINDING and JIG BORING to your specification

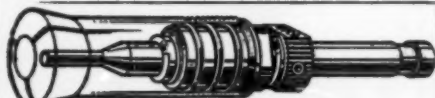
At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

**A. K. TOOL CO., INC.**

ROUTE 22, MOUNTAINSIDE, N. J.

Telephone: ADams 2-7300 Dlgby 9-1445, N.Y.C.

Use postpaid card. Circle No. 370



### NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 Days Free Trial. Several Territories Open for Distributors.

Write for Bulletin

**THE BYSTROM COMPANY**

6106 Park Ave. South Minneapolis 17, Minn.

Use postpaid card. Circle No. 371

Plain Type

TRADE

**AUTOM**

MARK

Offset Type

## CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to suit the job.

THREE-FOURTHS  
OFFSET

**AUTO MOULDING**

**& MFG. CO.**

1110 E. 87TH ST.  
CHICAGO 19, ILL.

Use postpaid card. Circle No. 372

### SPECIFICATIONS

Open width  $\frac{7}{8}$ " to 6"  
Gage Material .040 to .187"  
Pin Diameter .093" to  $\frac{1}{2}$ "  
Lengths to 120"

SEMI-OFFSET

of Acme Steel Co.'s Government Marketing Division, Riverdale, Ill. . . . **Malcolm Hunt** was appointed assistant to the president at Macklin Co., Jackson, Mich. . . . **Joseph T. Ryerson & Son, Inc.**, Chicago, Ill., named **Robert H. Wasz** assistant vice-president and **Norman F. Rewoldt** manager of its San Francisco, Calif. plant . . . **L. E. Jolls** was named quality control manager of domestic operations at Ford Tractor Operations, Ford Motor Co., Birmingham, Mich. . . . **E. W. Bliss Co.**, Canton, Ohio, appointed **H. Laurence Desmond** factory manager of the Hastings Division . . . **Frederick Olsen** was named plant superintendent by The Baird Machine Co., Stratford, Conn. . . .

**H. K. Porter Co., Inc.**, Riverside, N.J., named **Loy C. Collingwood** manager of Alloy Metal Wire Works Division . . . **John D. Amoroso** was promoted to general plant manager of Basco, Inc., North Tonawanda, N.Y. . . .

**Pratt & Whitney Aircraft**, Division of United Aircraft Corp., East Hartford, Conn., announced the following promotions: **Edmund D. Brown**, assistant chief engineer, advanced power systems; **William H. Sens**, assistant chief engineer, advanced jet systems; **Frank T. Sprogell, Jr.**, assistant chief engineer, production . . .

The **Griscom-Russel Co.**, Massillon, Ohio, has appointed **Gustave J. Walent** supervisor of machine shops . . . **William H. Mohr** was named plant manager of the American Can Co.'s Canco plant in Kansas City and **Vere Wiesley** was named assistant manager of manufacture in the eastern area . . . **J. L. Kuplic** has been appointed production manager at Kohler Co., Kohler, Wis. . . . **Sylvania Electric Products Inc.**, Warren, Pa., appointed **James O. Lawson** manager of quality control for the Parts Division . . .

continued

## DURANT HEADED PINS



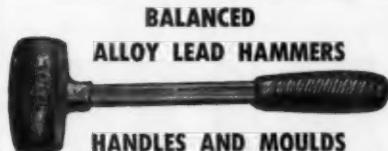
All tool steel Rockwell C 58/60 — honed finish, no pickup — heads left soft and are guaranteed uniform. Attractively priced at \$12. to \$19. per C. We manufacture 103 and stock 103 sizes for immediate delivery.

Available through our distributor or order direct.

Write for complete prices and details.

**DURANT TOOL CO.**  
12 THURGOOD AVENUE  
PROVIDENCE 8, RHODE ISLAND

Use postpaid card. Circle No. 374



## BALANCED

## ALLOY LEAD HAMMERS

## HANDLES AND MOULDS

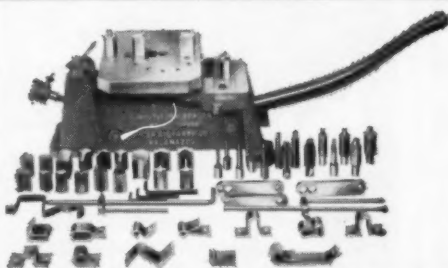
1, 1½, 2½ and 5 lb. sizes—order your alloy lead hammer requirements from your mill supply house, or direct from:

**KITZMAN MFG. CO.**

Manufacturers Of Lead Hammer Products

15061 Hartwell Ave. Detroit 27, Mich.

Use postpaid card. Circle No. 373



## Multiform BENDER CUTTER

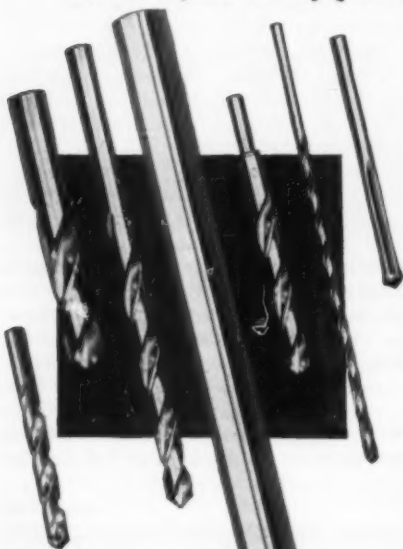
## BENDS, CUTS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to 1½" x 1½" as illustrated, other models up to ½" x 8".

**J. A. RICHARDS CO.**  
DEP. 6B, KALAMAZOO, MICH.

Use postpaid card. Circle No. 375

**Toughest, hardest, strongest**  
*... none finer at any price!*



*It pays to specify*

# ACE

**DRILLS  
REAMERS  
BLANKS**

**Premium Quality High Speed Steel**  
**Carbide Tipped and Solid Carbide**

*Call your local distributor today—or write Ace  
 direct for latest catalog and price information.*



**ACE DRILL**  
**Adrian, Michigan**

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS  
**Use postpaid card. Circle No. 376**

## THIS MONTH continued

### Personnel Changes . . .

#### Sales and Service



W. M. James



Richard Miller

William M. James has been promoted to vice-president in charge of sales of Scherr-Tumico, Inc., St. James, Minn. . . . Richard Miller, president of Tool Service, Inc., Chicago, has been named midwestern representative of U. N. Alloy Steel Corp. . . . Donald J. Wallace has been advanced to vice-president of sales for the Detroit Tool Sales Division of Wheel Trueing Tool Co., Detroit, Mich. . . . G. Harvey Porter has been appointed director of marketing services of The Black and Decker Mfg. Co., Towson, Md., succeeding Joseph H. Schmidt, Jr., who was promoted to general sales manager of the power tool firm's consumer products division . . . Sharon Steel has announced the fol-



**Make 3  
hammers  
AT ONCE!**



It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.

*Write for circular and prices*

**COOK LEAD HAMMER SERVICE**  
 67 MASSAHOIT AVE., EAST PROVIDENCE, R. I.  
**Use postpaid card. Circle No. 377**

MACHINE and TOOL BLUE BOOK

lowing promotions: Edwin A. Wyld to manager of district sales; Robert W. Keenan to assistant to the vice-president of sales; and Patrick L. Henry to manager of production planning.



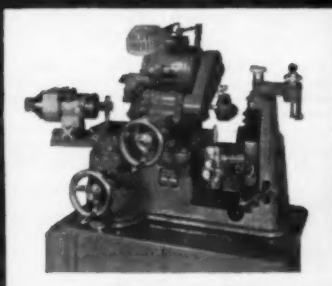
G. D. Pfaffmann



Paul Lytle

George D. Pfaffmann has been appointed manager of the Michigan district for TOCCO Division of the Ohio Crankshaft Co., Cleveland . . . Adamas Carbide Corp., Kenilworth, N.J., named Paul Lytle district manager of its  
continued

**HYBCO**  
**TAP GRINDER**  
Sharpens Chamfers, Flutes  
and Spiral Points



**MODEL 1100**

- Capacities No. 0 Machine Screw to 2 1/2" Hand Taps. Write for Catalog

**HENRY P. BOGGIS COMPANY**  
708 E. 163rd St. Cleveland 10, Ohio

Use postpaid card. Circle No. 378

December, 1961



**DRILL THESE HOLES**  
BY A QUICK, EASY, INEXPENSIVE METHOD  
Your business letterhead will bring literature  
**WATTS BROS. TOOL WORKS**  
Wilmerding, Pa.

Use postpaid card. Circle No. 379

**KELLER Die Filers**  
3 LOW COST MODELS

4 WAY TILTING TABLE . . . rugged, oilite bearings, balanced scotch yoke, 2 speeds. **ECONOMY F256 — ONLY \$119.00. STANDARD F256A — with file roller support arm, \$139.00. DELUXE F256B — with spring loaded slide and hardened jaws, \$159.00.**



**KELLER DIV.**  
*Sales Service Mfg. Co.*  
2361 University Ave., St. Paul 14B, Minn.  
Use postpaid card. Circle No. 396

All complete with  
1/4 H.P.  
motor  
F.O.B.  
Factory

**THE FAST WAY  
TO STAMP NAME PLATES  
IN A STRAIGHT LINE**

40 Dies  
1/16" size  
to 3/8".  
Replace-  
able.

Powerful



Automatic  
Advance.

Line Spacer.  
"Carried in Stock"

Write for  
Hercules  
Folder &  
Catalog  
Today

**ACROMARK**  
Company

15 Morrell St.  
Elizabeth 4, N.J.

"THE ORIGINAL MARKING SPECIALISTS"

Use postpaid card. Circle No. 381

## THIS MONTH continued

southern Ohio and Indiana territory . . . E. W. Bliss Co., Canton, Ohio, named **James L. Chase** sales manager of container machinery . . . **Mabbett K. Reckord, Jr.**, has been appointed assistant manager of sales for U.S. Steel Corp., Chicago, Ill. . . . **Parker Hannifin**, Cleveland, Ohio, has announced the following promotions: **Arthur D. Charboneau** as Pacific Northwest regional manager; and **John W. Tuohy** as sales engineer for industrial pneumatic and hydraulic products . . . **Stanley W. Ewing, Jr.** has been named assistant manager of steel sales of the Pittsburgh Office, Climax Molybdenum Co. . . .

**American Drill Bushing Co.**, Los Angeles, Calif., has appointed **Lawrence J. Stein** sales engineer in the San Fernando Valley . . . **John D. Winninghoff** has been named marketing manager for the Research Precision Mechanisms Division of The Barden



L. J. Stein



J. D. Winninghoff

Corp., Danbury, Conn. . . . **A & C Engineering Co.**, Warren, Mich., appointed **Carter Hayward** and **John B. Stevenson** sales engineers . . . The New Britain Machine Co. promoted **James M. Beyvl** and **Max C. Hartmann** to sales engineers . . . **William S. Young** has been appointed district manager of the Grand Rapids sales office and **Richard A. Smith** was named manager of merchandise sales of the New Bedford Division of Revere Copper and Brass Inc., New York, N.Y. . . .

## CAMS

Complete Facilities For  
**CAM MILLING and  
CAM GRINDING**

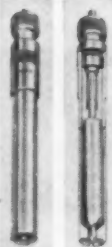
To Your Specifications

**CAM Services Co.**

DIVISION OF HIMOFF MACHINE CO.  
23-16 44th ROAD LONG ISLAND CITY, N.Y.



Use postpaid card. Circle No. 382



## KELLY "TRU-CENTER" EXPANDING TRANSFER PUNCHES SPEED WORK

With Micrometer Accuracy to .001. No. 300 set of 3 covers 437 thousandths— $\frac{1}{4}$ "— $\frac{11}{16}$ ". No sticking or forcing out of holes. No fallout when working sideways or up. Removable center pin for easy sharpening. Eliminates using 25 or more solid punches. Set of 3 in hardwood box—\$16.95—plus postage. Money Back Guarantee. (Cut-away view right.)

**KELLY TOOL & MFG. CO.**  
3408 Monterey Rd. Los Angeles 32, Calif.

Use postpaid card. Circle No. 383



## DYKEM STEEL BLUE

**Stops Losses**

making Dies and  
Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead  
**THE DYKEM COMPANY**  
2301G North 11th St. • St. Louis 6, Mo.

Use postpaid card. Circle No. 384

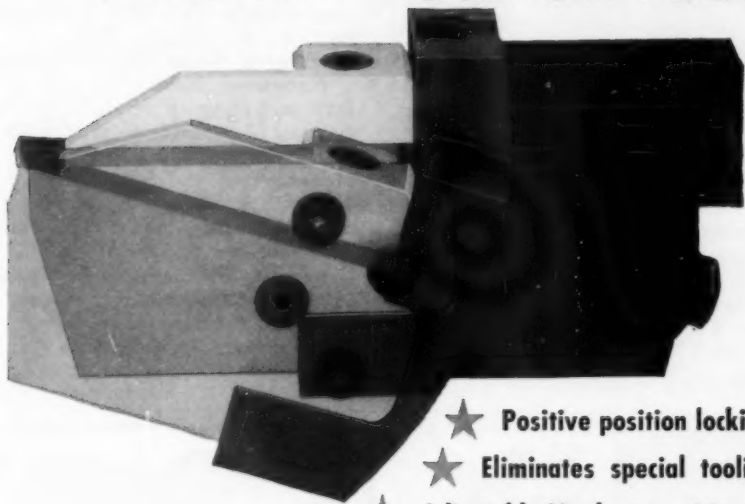
# Another P.D.Q. *FIRST!*

## ★ *NEW*

### ADJUSTABLE RAKE

*Manchester...*

### Cut-off Tool



- ★ Positive position locking.
- ★ Eliminates special tooling.
- ★ Adjustable 0° rake to positive 16°
- ★ Re-setting without losing center location.
- ★ Eliminates grinding for proper rake angle.
- ★ Available for all makes of Turret Lathes, Engine Lathes, Automatics and Cut-off Machines.

This new "Manchester" tool can save special tooling costs and time costs in special tool grinding. The tool is infinitely adjustable to any setting from 0° rake to positive 16°. Cutting point is always at center height regardless of rake angle to insure correct cutting action. Complete facts are available, write for literature.



## PORTAGE Double-Quick, Inc.

1037 SWEITZER AVENUE • AKRON 11, OHIO

Use postpaid card. Circle No. 385



## New Distributors . . .

### Eastern

**Adamas Carbide Corp., Kenilworth, New Jersey.**

(tungsten carbide tools, tool tips, dies, wear parts, toolholder for throw-away inserts, and a milling cutter)  
**Phillips Machinery & Supply Co., College Park, Md.**  
**Westmoreland Specialty Tool Corp., Murrysburg, Pa.**

### Midwest

**The American Tool Works Co., Pearl at Eggleston Ave., Cincinnati 2, Ohio.**

(lathes, radial drills, and special machinery)  
**White Star Machinery and Supply Co., Inc., 720 E. 10th St., Wichita, Kansas.**

**Apex Broach Co., Inc., Detroit, Mich.**  
(special and custom broaches, and standard and special broaching machines and hydraulic presses)  
**Tool Supply Co., 3210 Bloomington Ave. S., Minneapolis, Minn.**

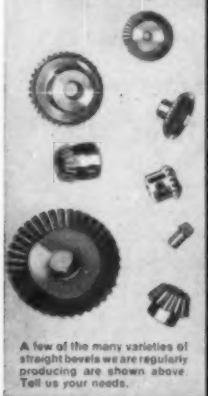
**The Edward Blake Co., 570 Pleasant St., Watertown, Mass.**

(tap and chamfer grinders and distributor of Black Diamond and Worcester drill grinders)  
**McNeal Tool and Supply Corp., 325 7th St. S.E., Cedar Rapids, Iowa.**

**Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.**

(power cylinders and air control valves, and air pressure regulators, filters, and lubricators)  
**Vincent Brass & Aluminum Co., 124 12 Ave. S., Minneapolis 15, Minn.**

FOR STRAIGHT  
BEVELS



A few of the many varieties of straight bevels we are regularly producing are shown above. Tell us your needs.

20 to  
200 D.P.

Send your prints  
for quotations

- SPURS
- HELICALS
- WORM AND WORM GEARS
- STRAIGHT BEVELS
- LEAD SCREWS
- RATCHETS
- CLUSTER GEARS
- RACKS
- INTERNALS
- ODD SHAPES

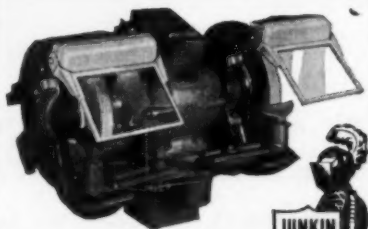
THE Finest

IN GEARS

**Beaver Gear Works Inc.**

1033 PARMELE STREET, ROCKFORD, ILLINOIS

Use postpaid card. Circle No. 386



### The Shield which COMMANDS OPERATOR SAFETY

This new shatter-proof Electro-Lock Shield, due to its interlocked power and light circuits, will not permit a machine to be operated when the Shield is not in a full protective position.

Write for complete information today.

**Junkin Safety Appliance Co.**

3121 MILLERS LANE • LOUISVILLE 16, KY.

Use postpaid card. Circle No. 387



# The Exceptional NEW CONCEPT of WIDER USES FOR ABRASIVES



*Replacing Older, Costlier Production Procedures*

**RUBBER-CUSHIONED BRIGHTBOY**

**Can Save You Up to 50% in Time!**

**Simultaneous BURNING • CLEANING • FINISHING • POLISHING**

**on Metals • Wood • Glass • Fiberglass • Laminated Materials • Some Plastics**

Brightboy's revolutionary rubber-and-abrasive formulation achieves a combination working-action almost unbelievable in ability, adaptability, time savings and work quality. Introduces a refreshingly new, exceptional concept of abrasive functions and versatility, plus simplification and speed-up of the conventional uses of abrasives. Bridges the gap between the grind and buff in one operation. A Brightboy finish frequently constitutes the final polish.

**JOB-MATCHED, TIME-&MONEY-SAVING STOCK SIZES AND TEXTURES** are specially suited to your production requirements. Immediately available wheels, sticks, rods, blocks and points for machine

and manual work. Wide range of Silicon Carbide and Aluminum Oxide grains and textures—extra fine to extra coarse—in soft, semi-firm, firm and tough rubber binders. The only complete, comprehensive stock line of soft rubber bonded abrasives.

**WRITE US FOR  
REVEALING DATA  
ON EXCEPTIONAL,  
MULTI-USE  
BRIGHTBOY:**

- Methods & Applications
- Machine Speeds
- Comprehensive List of Job-Matched Stock Items
- Attractive Prices



**BRIGHTBOY INDUSTRIAL DIVISION  
WELDON ROBERTS RUBBER CO.**

95 North 13th Street

Newark 7, N.J.

*America's Pioneer Manufacturer of Rubber-Bonded Abrasives*

**Use postpaid card. Circle No. 388**

## A

Abrasive Belt Machines, 181  
Abrasive Belts, Discs, Wheels,  
Stones, etc., 215, **239**  
Abrasive Cut-Off Machines, **23, 43**  
Angle Dressers, **164, 181**  
Angle Plates, **164, 170, 171, 187,**  
**227**

## B

Baffles, water cooler, 206  
Barrel Finishing Equipment, 150  
Bars, support, **57**  
Bearings, bronze, **57**  
Bearing, needle, 224  
Bending & Forming Machines,  
151, 160, **209, 233**  
Blanks, drill & reamer, **234**  
Boring Bars, **157, 166, 226**  
Boring Heads, **15, 27, 219, 223,**  
**241**  
Broaches, 212  
Broaches, keyway, **154**  
Bushings, drill & jig, **230**  
Bushings, brass & bronze, **57**

## C

Cam Grinding, **236**  
Cam Milling, **236**  
Cams, **167, 182**  
Castings Materials, **185**  
Centers, live, **88, 153**  
Checking Equipment, 214  
Choppers, scrap metal, **158**  
Chucks, jaw, **65**  
Chucks, lathe, special-purpose,  
**69**  
Chucks, Rotary, **86**  
Chucks, tapping, 196  
Clamps, toggle, **79**  
Cleaners, 175, **216, 226**  
Coil Cradles, **158**  
Collet Stops, **232**

Collets, **90, 243**  
Comparators, dial, 228  
Compounds, case-hardened, **225**  
Contour Units, **155**  
Control, chambers, 170  
Controls, electronic, 182  
Coolant Spraying Systems, **168**  
Counterbores, **1**  
Countersinks, **21, 186, 192**  
Couplings, 198  
Cut-Off Blades, **37**  
Cut-Off Machines, **53, 59**  
Cutting Fluids, **71, 85**

## D

Deceleration Equipment, **41**  
Diamond Wheel Dressers, **222**  
Die Filers, **184, 235**  
Die Heads, **137**  
Die Makers' Supplies, **213**  
Dies, **169**  
Dies, press brake, **29**  
Dividing Heads, **219**  
Drafting Machines, 204  
Dressers, grinding wheel,  
mechanical type, **176**  
Dressers, wheel, **152**  
Dressing Cutters, electrode, **204**  
Drill Heads, multiple spindle,  
**35, 74, 77, 183, 201**  
Drilling Attachments, 179, 218,  
**220**  
Drilling Machines, automatic,  
**165, 192**  
Drilling Machines, bench, 190  
Drilling Machines, gun, **245**  
Drilling Machines, numerically  
controlled, 141, **145**  
Drilling Machines, press, **51, 66,**  
**138, 139, 163, 167, 168, 173**  
Drilling Machines, radial, 176  
Drilling Machines, turret, 176  
Drilling Systems for odd shapes,  
**235**  
Drills, **21**  
Drills, carbide, **234**  
Drills, high-speed, **234**

Drills, twist, **247**  
Dust Collectors, 170, **198, 205**

## E

End Mills, **25, 63, 185**  
Engraving Machines, **33**

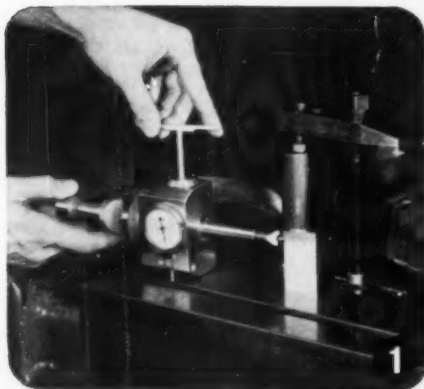
## F

Fabricators, **87**  
Facing Heads, **166**  
Feeders, parts, **61**  
Feeders, roll, **158**  
Files, Hand, **45**  
Finishing Machines, 166  
Flanging Machines, **175**  
Furnaces, heat-treating, electric,  
**160, 194, 221**  
Furnaces, heat-treating, gas, **151**

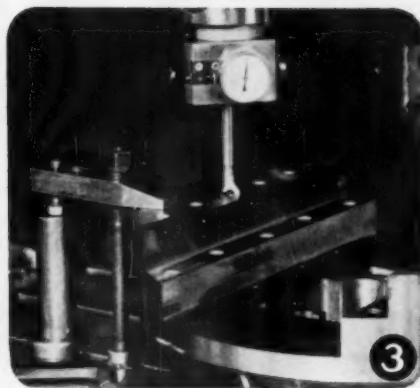
## G

Gages, depth, 222, **227**  
Gages, dial indicator, **31**  
Gages, electric, **67**  
Gages, electronic, 178, 217, 224,  
**248**  
Gages, height, 209  
Gages, plug, 201  
Gear Hobbing Machines, **80, 81**  
Gears, **182, 227, 238**  
Grinders, carbide tool, **210**  
Grinders, portable, **179**  
Grinders, tap, **234**  
Grinding Fixtures, tool &  
cutter, 202  
Grinding Machines, carbide, **223**  
Grinding Machines, centerless,  
**8, 9, 48, 49**  
Grinding Machines, chamfer, **167**  
Grinding Machines, cylindrical,  
**195**  
Grinding Machines, surface, **149,**  
**159, 174**

NOTE: Bold face indicates products which are described in advertisement in this issue.



**Bokumicro-Dial  
Boring Heads provide  
fast, easy set ups with  
accuracy to .000050"**



Bokumicro-Dial Boring Heads reduce set-up time to a minimum and provide toolroom accuracy at the same time.

Picture (1) shows how simply by inserting and turning the key, the operator presets the boring tool to rough dimension from gage blocks. (2) The Bokumicro-Dial Boring Head and fast cutting Bokum Boring Tool are inserted into a DeVlieg Flash-Change Adapter. (3) Tool is now ready to make rough bore.

Tool settings as close as .000050" are

easily obtained on the final setting with the use of the built-in dial indicator which by-passes backlash. While holder is still in the machine and by watching the .0001" indicator, the operator can set the tool movement precisely to .000050". No lock-up screws are used, thus no clamping errors can occur.

Bokumicro-Dial Boring Heads can be supplied with any type of drive shank and are available for  $\frac{3}{8}$ " and  $\frac{1}{2}$ " diameter shank boring tools. Order today!



**BOKUM TOOL COMPANY, INC.**

14775 WILDEMERE AVENUE • DETROIT 38, MICHIGAN  
Use postpaid card. Circle No. 390

Grinding Machines, tool & cutter, **27, 219**  
Grinding Wheel Equipment, 186  
Grinding Wheels, **76**

## H

Hammers, lead, **233, 234**  
Hammers, plastic, **222**  
Hardness Testing Instruments, **150, 151, 215**  
Hinges, continuous, **232**

## I

Indexers, **220**  
Inserts, throwaway, **157**

## J

Jig Borers, **13, 224**  
Jig Boring, **232**  
Jig Grinding, **232**  
Jigs & Fixtures, **83, 156, 226**

## K

Keyseaters, **53, 211**  
Knives, band, **31**  
Knobs, hand, **162**

## L

Lapping Compounds, **211**  
Lathes, engine, **47, 68, 156, 158, third cover**  
Lathes, finishing, **2, back cover**  
Lathes, tracer, **inside front cover**  
Lathes, turret, **140**  
Layout Dye, **224, 236**  
Liners, **199**

## M

Machine Builders, special, **83**  
**185, 197, 235**

Marking Machines, **148, 180,**  
Marking Stamps, **187, 212**  
Measuring & Checking Equipment, **206**

Metallizing, **16, 17**  
Metalworking, **178**  
Micrometers, **182, 189**  
Milling Cutters, **157**  
Milling Cutters, inserted carbide, **157**  
Milling Machines, hand, **196**  
Milling Machines, hydraulic, **196**  
Milling Machines, numerical controlled, **27**  
Milling Machines, vertical, **11, 47**

## N

Notching Equipment, **203**

## O

Oilers, **221**  
Optical Instruments, **172**

## P

Pins, **233**  
Pins, dowel, **184**  
Plates, wear, **199**  
Press Brakes, **72, 75, 169**  
Presses, eccentrics, **144**  
Presses, gap, **186, 200**  
Presses, horn, **186**  
Presses, hydraulic, **223**  
Presses, O.B.I., **79, 186**  
Presses, straight side, **186, 200, 231**  
Profiling Machines, **11**  
Pumps, coolant, lubricant & oil, **82, 227**  
Punch Holders, **158**  
Punches & Dies, **161, 228**  
Punching Machinery, **47**  
Pushers & Pusher Tools, **32, 90**

## R

Radius Tools, **164, 181**

Reamers, **174, 207, 234**  
Recessing Tools, **166, 219**  
Riveting Machines, **180**

## S

Safety Devices & Equipment, **238**  
Saw Blades, band, **31, 45, 188, 214**  
Saw Blades, circular, **21**  
Saw Blades, hack, **31, 45**  
Saw Blades, hand, **6, 45**  
Saw Blades, hole, **31, 45**  
Sawing Machines, band, **55, 84, 89**  
Sawing Machines, cut-off, **217**  
Sawing Machines, special, **230**  
Scanning Machines, **11**  
Scrapers, hand, **150**  
Screws, cap, **73**  
Screws, set, **73**  
Screws, transfer, **225**  
Sealants, **207**  
Shapers, **154**  
Shearing Machines, **47, 70, 175, 191**  
Shears, **146**  
Speed Reducers, **182**  
Spindles, air, **184**  
Spindles, high-speed, motorized, **250**  
Spotter Sets, **228**  
Spring Plungers, **162**  
Spur Gear Racks, **218**  
Stamping Machines, **222**  
Steel Selection, **31, 91**  
Storage Equipment, **181**

## T

Tables, elevating, **177**  
Tables, indexing, **182, 193**  
Tables, rotary, **170, 171, 187**  
Tachometers, **202**  
Tappers, **147**  
Tapping Machines, **165, 208**  
Taps, **39**  
Thread Rolling Machines, **151**  
Threading Machines, **19**  
Threading Tools, **166**  
Tool Changer, **180**

NOTE: Bold face indicates products which are described in advertisement in this issue.

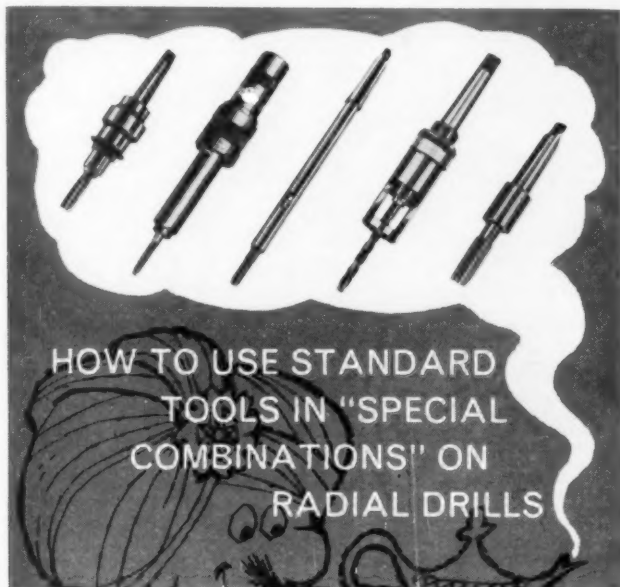
Tool Holders, 4, 157, 181  
 Tools, boring, 187  
 Tools, chamfer, 192  
 Tools, carbide, 199  
 Tools, cutting off, blade, 237  
 Tools, facing, 187  
 Tools, grooving, 187  
 Tracing Equipment, 143  
 Transfer Units, 148, 236  
 Turning Heads, 219

**U**  
 Ultrasonic Equipment, 190

**V**  
 Valves, 188, 224

Vibration Units, 164  
 Vises, 170, 171, 187, 216, 225

**W**  
 Washers, 162  
 Welding Equipment & Supplies,  
 173, 193, 208  
 Wire Forming Machines, 146



You can get more out of radial drills if you use standard Scully-Jones tools in "special combinations." For example: A "Safe-Torque" driver with quick-change collet combines fast tool changing with breakage-free tapping. In the same combination, you could add a close-center tap driver and avoid the expense of special length taps. The S-J drill stop controls hole depth and incorporates quick-change features of its own . . . as does the S-J heavy-duty tap holder. It is not uncommon to see four standard S-J tools used simultaneously in plants which demand high efficiency.



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1907 South Rockwell Street, Chicago 8, Illinois

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# BB

## Index to Advertisers

### A

A. K. Tool Company, Inc.	232
Aaron Machinery Company	47
Ace Drilling Corporation	234
Acromark Company	235
Aget Manufacturing Company	198
Alina Corporation	189
Allen Collet Manufacturing Company	90
Allen Manufacturing Company	73
Allenair Corporation	193
Allison-Campbell	23
(Div. American Chain & Cable Co.)	
American Cam Company	167
American Chain & Cable Company	23-215
(Allison-Campbell Div.)	23
(Wilson Mechanical Instrument Div.)	215
American Sealants Company, Inc.	207
American Tool Works Company	Third Cover
Anderson Bros. Manufacturing Company	150
Anton Machine Works	178
Armstrong-Blum Manufacturing Co.	55
Armstrong Bros. Tool Company	4
Atlas Press Company	51
Auto Moulding and Manufacturing Co.	232
Avey Division	227
(Motch and Merryweather Mch. Co.)	

### B

Balas Collet Manufacturing Company	32
Baldor Electric Company	210
Barnes Company, Inc., W. O.	6
Beaver Gear Works	238
Beaver Pipe Tools, Inc.	43
Bellows-Valvair	41
Bentley Industrial Corporation	195
Beverly Shear Manufacturing Company	146
Biddle Engineering Company	229
Bijur Lubricating Corporation	168
Blanchard Machine Company	76
Blue Valley Manufacturing Company	175
Boggis Company, Henry P.	235
Bokum Tool Company	241
Brightboy Industrial Division	239
(Weldon Roberts Rubber Company)	
Brown and Sharpe Manufacturing Co.	63
Buffalo Forge Company	70
Bunting Brass and Bronze Company	57
Burgmaster Corporation	145
Bystrom Company	232

### C

Carroll Dividing Head Company	219
Cedarleaf Company, Gordon R.	229
Cerro Sales Corporation	185
Chicago Gear Works	227
Cincinnati Milling Machine Company	85
(Cincinnati Milling Products Div.)	
Cincinnati Milling Machine Company	8-9
(Grinding Machine Div.)	
Cincinnati Shaper Company	72
Circular Tool Company	21
Clark Instrument Company	152

Cleereman Machine Tool Corporation	165
Cleveland Crane and Engineering Co.	75
Cleveland Punch & Shear Works Co.	161
Columbus Die-Tool & Machine Co.	83
Commander Manufacturing Company	183
Cook Lead Hammer Service	234
Cooley Electric Manufacturing Corp.	194
Covel Manufacturing Company	2-149
Criterion Machine Works	15
Cunningham Company, M. E.	187
Cushman Chuck Company	69

### D

Danly Machine Specialties Company	213
Defiance Machine & Tool Company	197
Delta Power Tool Division	138-139
(Rockwell Mfg. Co.)	
Desmond-Stephan Manufacturing Co.	176
DeVlieg Microbore	27
(Div. DeVlieg Machine Co.)	
Di-Acro Corporation	29
Dixie Tool Industries, Inc.	199
Donley Products Company	230
Dreis & Krump Manufacturing Co.	200
Dremel Manufacturing Company	179
duMont Corporation	154
Durant Tool Company	158-233
Dykem Company	236

### E

Eclipse Counterbore Company	25
Eisler Engineering Company	182
Electro-Mechano Company	173
Empire Tool Company	37

### F

Federal Products Corporation	67
Federal Tool & Manufacturing Co.	222
Fellows Gear Shaper Company	80-81
Flynn Manufacturing Company	223

### G

Gaertner Scientific Corporation	172
Gisholt Machine Company	19
Grant Mfg. & Machine Company	180
Green Instrument Company	33
Greenerd Arbor Press Company	223
Grob, Inc.	88

### H

Hakansson Industries, Inc.	188
Hammond Machinery Builders	223
Hardinge Brothers, Inc.	4th Cover
Hayden, Howard A.	229
Heimann Manufacturing Company	225
Himoff-Cam Services	236
Huppert Company, K. H.	160

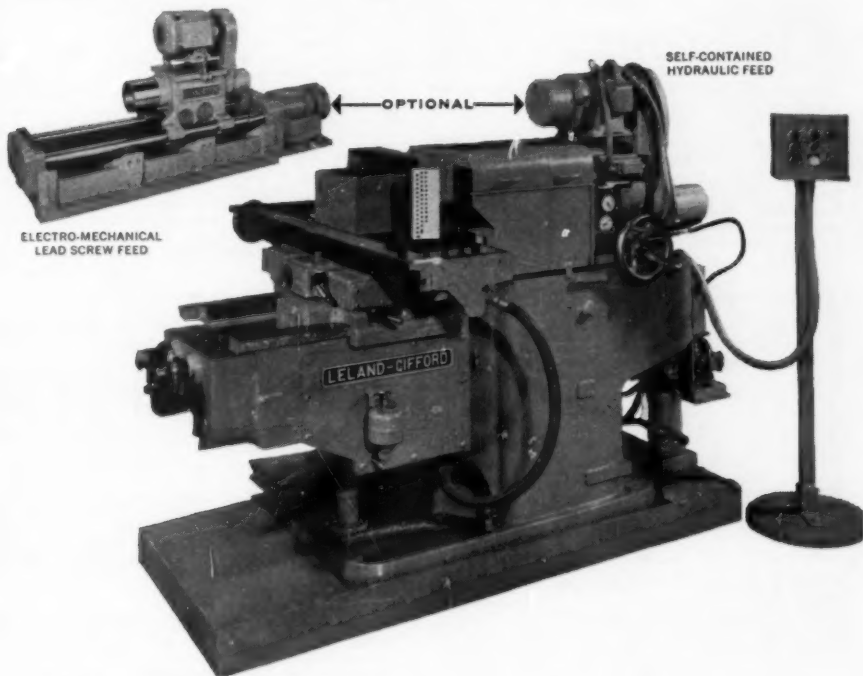


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<b>I</b>		
Ideal Industries, Inc.	84	
<b>J</b>		
J & S Tool Company	153	
Jarvis Corporation	77	
Johnson Gas Appliance Company	151	
Johnson Machine & Press Corporation	186	
Junkin Safety Appliance Company	238	
<b>K</b>		
Kasenit Company	225	
Kelly Tool & Mfg. Company	236	
Kent-Owens Machine Company	196	
Keo Cutters, Inc.	186	
Kitzman Manufacturing Company	233	
<b>L</b>		
L & J Press Corporation	231	
Landis Machine Company	137	
Leland-Gifford Company	245	
Linley Brothers Company	224	
Lodge and Shipley Company	2nd Cover	
Logansport Machine Company	85	
Lucifer Furnaces, Inc.	221	
<b>M</b>		
Machine Products Corporation	156	
Machine Tool Publications	229	
Magnaflux Corporation	226	
Manhattan Supply Company	247	
Mathews and Company, James H.	212	
Metco, Inc.	16-17	
Micrometrical Manufacturing Co.	206	
Midwest Tool & Engineering Co.	177	
Minster Machine Company	79	
Mitts & Merrill Manufacturing Co.	53	
Modern Machine Tool Company	59	
Modern Manufacturing Company	226	
Moore Special Tool Company	13	
Motch & Merryweather Mch. Co.	227	
(Avey Division)		
<b>N</b>		
National Machine Tool Company	211	
Neise, Karl A.	219	
Noble & Westbrook Mfg. Company	148	
Northwestern Tools, Inc.	162	
Norton Company	48-49	
<b>O</b>		
Oliver Instrument Company	155	
Oliver Machinery Company	217	
<b>P</b>		
Pacific Press and Shear Corporation	191	
Palmgren Products, Inc.	187	
Pannier Corporation	180	
Peaslee Metal Products Company	184	
Pines Engineering Company	209	
Pioneer Electric and Research Corp.	202	
Portage Double-Quick, Inc.	237	
Powermatic Machine Company	163	
Precise Products Corporation	192	
Procurier Safety Chuck Company	147	
<b>R</b>		
R. B. Tool Company	166	
Rice Pump and Machine Company	184	
Richards Company, J. A.	233	
Rick, Inc.	220	
<b>S</b>		
Rockwell Manufacturing Co.	66-138-139	
(Delta Power Tool Div.)	138-139	
(Walker-Turner Division)	66	
Rothfuss Tool Company	181	
Ruthman Machinery Company	82	
Ryerson and Son, Inc., Jos. T.	91	
<b>S</b>		
S & S Machinery Company	219	
Sales Service Mfg. Company	235	
Sanford Manufacturing Company	159	
Schmidt, Hermann	225	
Scully-Jones and Company	243	
Severance Tool Industries, Inc.	204	
Sheffield Corporation	190	
Sheldon Machine Company	140	
Sid Tool Company	174	
Soderling Co., N. F.	222	
(Div. Tahlen Hammer Co.)		
Soasner Tap and Tool Corporation	39	
South Bend Lathe, Inc.	68	
Spellman Company, R. L.	228	
Sperman Metal Specialties Company	164	
Standard Electrical Tool Company	250	
Starrett Company, L. S.	31	
Stuart Oil Company, Ltd., D. A.	71	
Syntron Company	61	
<b>T</b>		
Taft-Peirce Mfg. Co.	248	
Tahlen Hammer Company	222	
(Div. H. F. Soderling Co.)		
Tammes Industries, Inc.	224	
Thriftmaster Products Corporation	35	
Torit Manufacturing Company	205	
Tree Tool & Die Works	11	
True-Trace, Inc.	143	
<b>U</b>		
U.S. Automatic Box Company	227	
U.S. Drill Head Company	74	
Universal-Automatic Corporation	208	
Universal Engineering Company	78	
Universal Vise and Tool Company	170-171	
<b>V</b>		
Victor Machinery Exchange, Inc.	222	
Victor Saw Works	45	
Viking Tool Company	157	
Vogel Tool & Die Corporation	203	
<b>W</b>		
Wales-Strippit Company	87	
Walker Company, O. S.	86	
Walker-Turner Division	66	
(Rockwell Mfg. Co.)		
Wardwell Manufacturing Company	230	
Watts Brothers Tool Works	235	
Weldon Roberts Rubber Company	239	
(Brightboy Industrial Div.)		
Weldon Tool Company	1	
Wells Manufacturing Company	214	
Wells & Sons, Inc., W. F.	89	
Whistler & Sons, Inc., S. B.	169	
Wilson Mechanical Instrument Div.	215	
(American Chain & Cable Co.)		
Wilton Tool Manufacturing Company	216	
Woodson Tool Company	185	
<b>Z</b>		
Zagar, Inc.	201	

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31, 32	.20
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37, 38, 39, 40, 41	.18
42, 43, 44	.17
45, 46, 47, 48, 49,	.16
50, 51, 52, 53	.15
54, 55, 56	.15
57	.19
58, 59, 60, 61,	
62, 63, 64, 65,	.20
66, 67, 68	
69, 70, 71, 72,	.26
73, 74	
75, 76, 77, 78,	
79, 80	.29

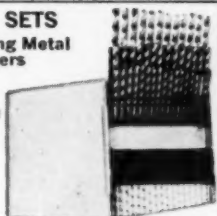
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1/4	1.16	17/32	2.94	13/16	6.37	1-3/32	11.97	1-1/2	23.73
17/64	1.23	35/64	3.12	53/64	6.62	1-7/64	12.39	1-9/16	26.46
9/32	1.23	9/16	3.15	27/32	6.62	1-1/8	12.39	1-5/8	29.96
19/64	1.30	37/64	3.57	55/64	6.93	1-9/64	13.58	1-11/16	34.23
5/16	1.30	19/32	3.57	7/8	6.93	1-5/32	13.58	1-3/4	35.35
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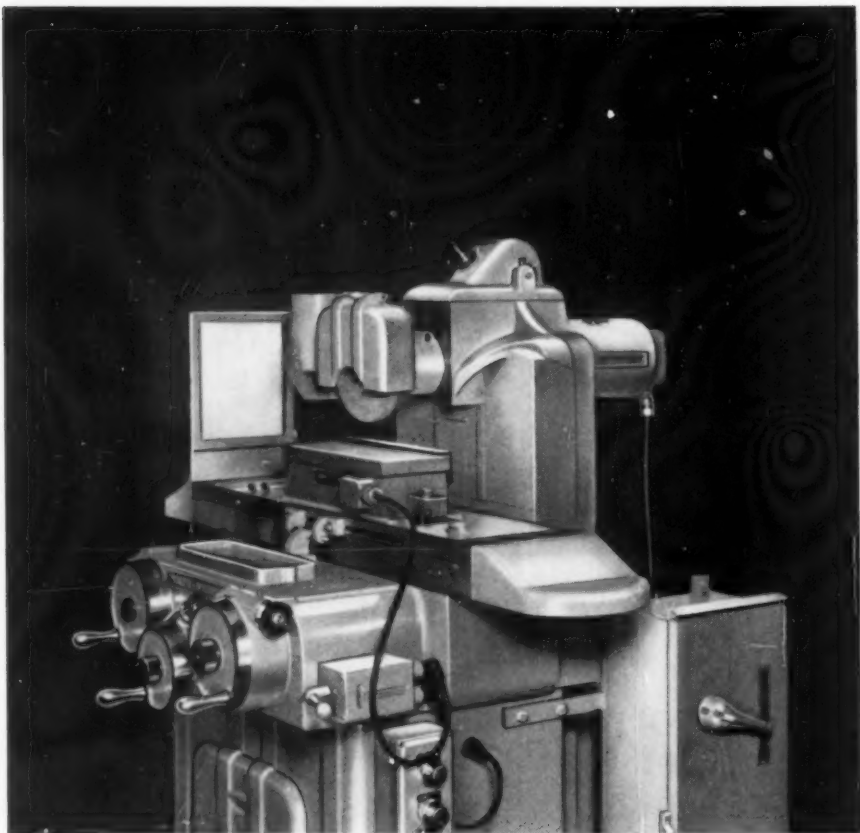
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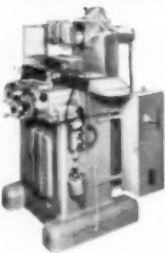
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**BB**

## ONE LAST WORD

### *Make the Reward Equal to the Risk*

This is the Age of Incentives. Even the sweeper is magnanimously included by his union mentors in the group bonus plan; from the president, through sales manager and salesmen and on to the turret lathe and grinder operators, incentives wind their rewarding way. There is ample precedent for this on a larger, and more basic, national scale. Pioneers hacked and hoed their way to fame and fortune; rails and bridges girded and spanned the nation, a symbol of effort and reward. For the successful, the laurel; for the failure, the hemlock.

For almost everybody, that is, except the engineer!

Incentives, bonuses, rewards have passed him by. Here there is neither fame nor fortune. There is only failure. Where is the engineer who gets a bonus if he saves 100 thousand dollars in production costs? Or reduces the cost of manufacturing by 1, 2 or even 3 per cent? Or introduces devices which slash direct labor cost?

Where lies the reward for the engineer? Where is the pay-off for the successful new concept, the ingenious tooling, the new n. c. equipment? When are the midnight oil, the doodling and the dreams translated into coins of the realm?

Alas, I cannot answer those questions! But this is known: If the idea isn't

successful, if the clever tooling literally crawls with bugs, his name will be stricken from the records, his desk moved into a dark corner and the telephone disconnected. He'll be a dead engineer and people will point the finger of scorn. An engineer can't bury his mistake, can't curse poor economic conditions because the order was lost, and can't blame his subordinates because the new product recently introduced laid an egg the size of a football. No, his mistake adorns him like an albatross.

Thus we have a situation where the engineer is not rewarded for success but flayed for his failure. The result? No large ideas, no mighty ventures, no daring proposals—only mewling, little efforts which are part of his job classification. And this at a time in our nation's economy when every ounce of endeavor and brains and adventure-some spirit is so desperately needed.

Technologically, this country has paced the world; production-wise, we have shown the way—but the world has caught up. We need to get to work. If you ask, what can be done, one answer would be: Free the engineer and the production brains, let them propose and develop and introduce new ideas and concepts, but reward them for their successes. Make the reward equal to the risk.

*Wm. F. Schleicher*  
Publisher

a new future for your present machine . . .

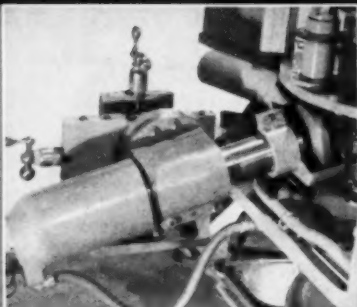
with

## STANDARD "Building Blocks"

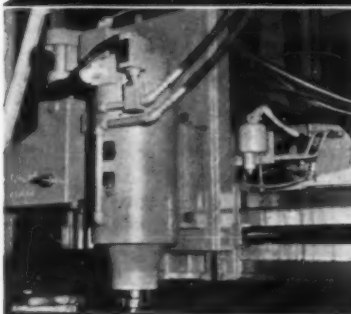
Follow the lead of manufacturers who have found a quick, money-saving way to convert or modernize existing, even out-dated, machine tools with a "building block" assembly of STANDARD Super Precision Spindles, Slides, Feeds and Swivels. A few recent "building block" installations are shown below.



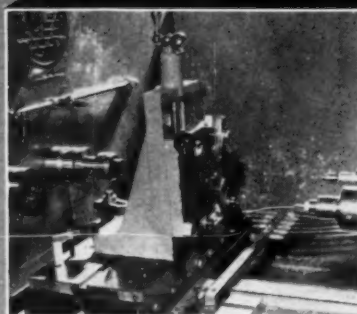
ELECTROLYTIC GRINDING . . . Type 6012LY Super Precision Electrolytic Spindle, 1000 ampere capacity; with 15" diameter 360° swivel, angle bracket and Type 1G slide; mounted on a Giddings & Lewis Planer.



GRINDING . . . Type 2712 Super Precision Grinding Spindle; mounted on a Style L mounting bracket with a 360° swivel and Type 6C slide assembly; installed on automatic indexing automation type machine.



MILLING . . . Type 6040M Super Precision Milling Spindle; 2-speed, liquid-cooled, mounted on a Rockford "Kopy-Kat" Open Side Planer.



DRILLING . . . Type 5C slide and Super Precision Drilling Spindles mounted on a special machine; slide serves as a precision fixture holding device.

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**REMEMBER WHEN...**

## Doing The Job Fast Was Essential?

(AND DOING IT RIGHT WAS NECESSARY, TOO!)

It still is!

As a manufacturer, you know that in this day of foreign competition and high material and labor costs, doing the job fast . . . and right . . . is critical. Many manufacturers are using machine tools built by The American Tool Works Company to knock hours off their precision machining.

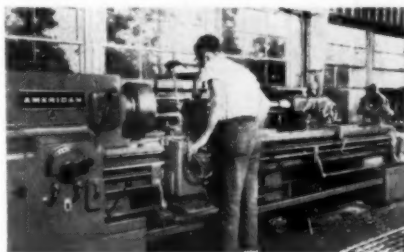
For example, take Brown Oil Tool, Inc. of Houston, Texas . . .

A leading manufacturer of oil well completion equipment, Brown Oil Tool had a bottleneck in the production of hydraulically set retrievable packers from Timken seamless tubing. Releasing stems were slow to produce because of the complex shape and close tolerances required. Switching to an American Modulated Feed Tracer Lathe reduced machining time 75%! Handling plunge tracing as well as steps and shoulders, Brown's American lathe consistently holds a template-to-workpiece tolerance of 0.0005".

According to Mr. Joe R. Brown, Vice President in Charge of Manufacturing, machining time on these packers was reduced from 2½ hours to 20 minutes floor to floor . . . and Brown Oil Tool has shown an across-

the-board production increase of 50% on all jobs run on their American Modulated Feed Tracer Lathe.

If you would like *your* jobs done fast . . . and right . . . contact your American distributor. Or write to us for descriptive bulletins.



A leader in oil well production tools for a quarter century, Brown Oil Tool, Inc. uses an American Modulated Feed Tracer Lathe to produce precision hydraulic packers.



**THE AMERICAN TOOL WORKS COMPANY**

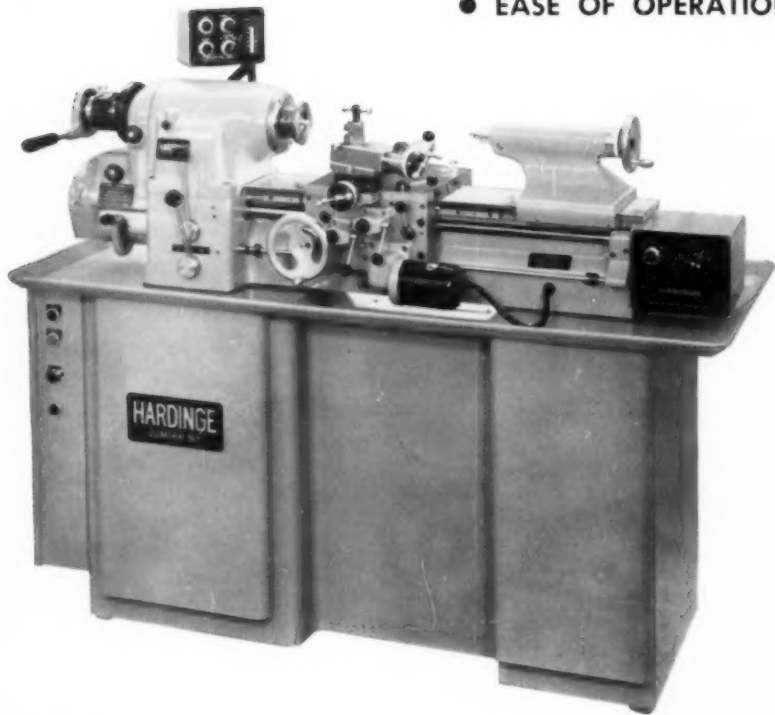
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- HIGH SPINDLE SPEEDS
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